
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION



SAFETY POLICY AND PROCEDURE MANUAL



Welcome On-Line User!

To aid in your navigation around this on-line manual several features are included:

- A hyperlinked *Table of Contents* in your left window that guides users throughout the entire manual
- Hyperlinks in the *Quick Reference* section of each safety policy and procedure that takes users to the desired place in the safety policy and procedure
- Hyperlinks throughout the safety policies and procedures which returns users back to page 1 of the applicable safety policy and procedure
- A hyperlinked *SPP to Chapter Index* which navigates users to the desired safety policy and procedure by a single click
- *New!* World Wide Web link to the OSHA standards from the *SPP to OSHA Index*
- *New!* *Workplace Safety Manual* link from the *SPP to SOP Index*

2/27/97

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SECRETARY'S SAFETY MESSAGE

The North Carolina Department of Transportation has embarked upon the Transportation 2001 plan to fine tune, redirect and expand the scope of transportation priorities in North Carolina. This comprehensive plan addresses the transportation needs of the entire state.

An important component of this transportation plan is ensuring the health and safety of our employees during the implementation and fulfillment of this plan. The skills, talents and experience of our employees are immeasurable. Therefore, the Department understands the benefits in providing a safe and healthful working environment.

We are pleased at the progress that has been made in reducing accidents and injuries in the workplace. However, we will not be satisfied until all employees realize safe and healthful working conditions in the performance of their job duties.

Developing and maintaining a safety culture requires ongoing line management and employee involvement in safety. Managers must continue to make safety number one by promoting programs that are effective in identifying and reducing hazards in the workplace, training our employees to work safely, and by making safety the primary consideration in all operations. Everyone who is in a position to supervise the work of others is responsible and will be held accountable for the safety of their employees.

Individual employees are expected to perform their duties in a safe and responsible manner. You, as an employee, should be alert at all times to your surroundings and fellow workers. Working safely is a condition of employment. The N.C. Department of Transportation believes that "all accidents and injuries are preventable," and we believe your help and cooperation can make this department a safer place to work.



A handwritten signature in dark ink, reading "Garland Garrett Jr." in a cursive script.

Garland Garrett Jr., Secretary
N.C. Department of Transportation

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

SAFETY PHILOSOPHY

1. All accidents and injuries can be prevented.
2. Management/supervisors are responsible, and will be held accountable, for preventing injuries and occupational illnesses.
3. Occupational safety and health is part of every employee's total job performance.
4. Working safely is a condition of employment.
5. All workplace hazards can be safeguarded.
6. Training employees to work safely is essential and is the responsibility of management/supervision.
7. Prevention of personal injuries and accidents is good business.

DEPARTMENTAL GOALS

SHORT TERM GOALS

(0 - 1 YEAR)

- | | |
|---|---|
| 1. Develop safety standards | 10. Make necessary changes in personnel system |
| 2. Develop continuing safety training | 11. Establish limited incentive/reward program |
| 3. Develop a continuous resource commitment | 12. Reorganize safety unit |
| 4. Keep up with Research & Development safety efforts | 13. Improve off-the-job safety |
| 5. Equipment acquisition to enhance safety | 14. Change operating procedures with safety in mind |
| 6. Safety modification of equipment | 15. Reduce accident and injury rates by 20% |
| 7. Safeguard and prioritize hazards | 16. Reduce Worker's Compensation by 20% |
| 8. Comprehensive structured program | 17. Increase employee safety awareness |
| 9. Formalize training program | |

INTERMEDIATE GOALS

(1 - 3 YEARS)

- | | |
|---|--|
| 1. Instill a safety attitude | 9. Make necessary changes in personnel system |
| 2. Total line supervisor commitment | 10. Improve off-the-job safety |
| 3. Develop safety standards and procedures | 11. Reduce accident and injury rates by 50% |
| 4. Develop continuing safety training | a) Accidents: number and costs |
| 5. Keep up with Research and Development safety efforts | b) Lost work days, incidence rate |
| 6. Equipment acquisition to enhance safety | 12. Reduce Worker's Compensation claims by 50% |
| 7. Safety modification of equipment | |
| 8. Safeguard hazards | |

LONG TERM GOALS

(4 YEARS +)

- | | |
|---|--|
| 1. Zero accidents and zero injuries | 6. Safety modification of equipment |
| 2. Develop continuing safety training | 7. Safeguard hazards |
| 3. Develop a continuous resource commitment | 8. Eliminate Worker's Compensation expenditures |
| 4. Keep up with research and development safety efforts | 9. Establish a complete incentive/reward program |
| 5. More equipment acquisition to enhance safety | 10. Instill a safety climate |

CARDINAL RULES

These offenses may be grounds for dismissal:

- Failure to report all incidents (accidents, injuries and near misses) immediately
- Possession or use of illicit drugs or alcohol
- Possession of firearms
- Malicious destruction of NCDOT property
- Fighting or horseplay
- Falsification of NCDOT safety documents

Safety Policy and Procedure Organization

SPP# A -1

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1.0 Purpose

The purpose of this safety policy and procedure is to describe the organization of all the safety policy and procedures contained in this manual.

2.0 Scope and Applicability

A brief discussion is presented first to provide the user with some background information on the safety and health requirement.

Secondly, a very brief summary of the safety policy and procedure (SPP) is provided to introduce the reader to the contents. If the user desires additional detail, the user can read further.

Thirdly, to whom the safety policy and procedure applies within NCDOT is presented. Sometimes the applicability is general and/or is specific to job classification or job duties.

3.0 Reference

This section lists the federal standards that are catalysts for these safety policy and procedures.

4.0 Policy

This section includes a policy statement that is definitive and accurate and states why NCDOT has the policy and how the objectives of the policy will be met. Additionally, the second sentence generally will state NCDOT's position on workplace compliance to a safety and health requirement to minimize or eliminate recognized hazards.

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The hierarchy of dealing with workplace hazards will always be engineering practices (try to engineer away the hazard), administrative practices (change employees' hours, task duration, task substitution, etc.), safe work practices (work safely around hazards once the preceding controls are in place), personal protective equipment (PPE) (provide a barrier against the hazards once all the preceding controls have been implemented), and training (recognize and avoid hazards).

5.0 General Responsibilities

This section includes a general statement of the overall responsibilities of all employees in NCDOT (managers/unit heads, supervisors, employees, Safety and Loss Control, Central Equipment Unit, and others as applicable).

6.0 Procedure

This section contains a general statement that lists the information that is to follow in the following subsections. This general statement introduces the administrative requirements of the safety policy and procedure.

6.1 Definitions

This section lists the applicable definitions for the safety policy and procedure.

6.2 General Provisions

This is the section of the safety policy and procedure where its general provisions and the program associated with it are detailed. Each provision of the safety policy and procedure is listed in separate sub/subsections as applicable.

6.2.1 Training

This section presents any training requirements associated with the safety policy and procedure. Additionally, training frequencies are also listed in this section.

6.2.2 - 6.2.x Specific Provisions of the Safety Policy and Procedure

These sections are the *essence* of the safety policy and procedure. These sections contain all the applicable details, guidelines, procedures, and technical information pertinent to the safety and health requirement covered by the safety policy and procedure.

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6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

This section details the managers'/unit heads' responsibilities in implementing the applicable safety policy and procedure. Generally, managers/unit heads will be responsible for:

- Funding and budgeting
- Identification of affected employees
- Obtaining and coordinating training for the identified employees
- Auditing of the safety policy and procedure implementation and compliance (program audit and compliance)

6.3.2 Supervisors

This section details the supervisors' responsibilities in implementing the applicable safety policy and procedure. Generally, supervisors will be responsible for:

- Ensuring that employees are provided with PPE as necessary for their job
- Ensuring that employees are trained for their jobs
- Performing facility and jobsite audits

6.3.3 Employees

This section details the employees' responsibilities in implementing the applicable safety policy and procedure. Generally, employees will be responsible for:

- Complying with the applicable Safety Policy and Procedure
- Reporting unsafe acts or conditions

6.3.4 Safety and Loss Control

The section details Safety and Loss Control's responsibilities in implementing the applicable safety policy and procedure. Generally, Safety and Loss Control will be responsible for:

- Providing prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning a safety policy and procedure
- Assisting in developing or securing the required training
- Working with Purchasing and Central Equipment Unit to ensure that all newly purchased equipment, supplies, etc. comply with current safety regulations and safety policy and procedure
- Providing consultative and audit assistance to ensure effective implementation of a safety policy and procedure

Air Compressor Storage Tanks**SPP# 1910.169****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the protection of North Carolina Department of Transportation (NCDOT) employees working with or on compressed air equipment.

2.0 Scope and Applicability

Air compressors are used for a variety of applications in NCDOT. Air compressor storage tanks store excess air that is generated from the compressor. Thus, air compressor storage tanks provide a convenient and readily accessible air source. However, because of the air pressure within these storage tanks, potential dangers can develop if certain practices and precautions are not followed.

This safety policy and procedure provides guidelines for the safe use of air compressor storage tanks. It includes provisions for training, discussion on where these air compressor storage tanks are used, and guidelines for locating drains and traps on air compressor storage tanks. Additionally, it presents requirements for gauges and valves and installation of gauges, valves, drains and traps.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

SAFETY POLICY & PROCEDURE

This safety policy and procedure applies to NCDOT employees who, as a result of their job duties, are exposed to or use Air Compressor Storage Tanks.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.145) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.206).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT will not tolerate malfunctioning air compressor storage tanks that are a threat to employee safety. When these hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Air Compressor Storage Tanks will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Air Compressor Storage Tanks. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Air Compressor Storage Tanks.

6.1 Definitions

Air Compressor Storage Tank

Pressurized vessel that stores air generated from an air compressor.

Drain Valve

A valve that is installed at the lowest point of an air compressor storage tank to provide for the removal of accumulated oil and water.

Trap

A device which uses venting head pressure to purge the tank from condensed water.

SAFETY POLICY & PROCEDURE

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Applications
- Drains and Traps
- Gauges and Valves
- Installation Requirements

6.2.1 Training

Affected employees will be trained in:

- The purpose of air compressor storage tanks
- The basic operation of air compressor storage tanks
- Maintenance requirements of drains and traps
- Reading gauges and operating valves
- Identifying damage and defects in the storage tanks

This training shall be performed upon initial employment and/or job reassignment. Periodic refresher training shall also be conducted at the discretion of the supervisor.

6.2.2 Applications

Air compressor storage tanks are typically used for tire inflation, pneumatic tool use, hoisting, and chipping. All air compressor storage tanks shall be operated and maintained in accordance with industry standards.

6.2.3 Drains and Traps

Drain valves must be located beneath a tank at the lowest point on all new equipment. Drain valves must be opened once a week to purge water build-up unless they are automatically operated traps.

6.2.4 Gauges and Valves

All air compressor storage tanks shall be equipped with a least one safety valve and pressure gauge. Gauges and safety valves will be tested at least every six months to ensure proper operation.

No valve of any type shall be placed between the air receiver and its safety valve.

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6.2.5 Installation Requirements

Air compressor storage tanks shall be installed such that all drains, handholes, and manholes are easily accessible. Air compressor storage tanks shall never be buried underground or located in an inaccessible place.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available for the purchase and repair of air compressor storage tanks in their areas. Additionally, they will be responsible for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure proper use and maintenance through regular standard audits of air compressor storage tanks.

6.3.2 Supervisors

Supervisors will ensure that only those employees who have been trained to work with air compressor storage tanks will be allowed to operate such equipment.

Supervisors will ensure that equipment as needed is available and is in good working condition. If the equipment is not in good working condition, they will ensure that such equipment is repaired.

Supervisors will ensure that air compressor storage tanks are inspected every six months and that employees are provided with Personal Protective Equipment (PPE) as necessary for their job. Appendix A provides a generic checklist for use by supervisors.

6.3.3 Employees

Employees will inspect air compressor storage tanks prior to use and note any damage or defects. Employees shall immediately report any damages or defects to their supervisors. Employees will empty manual drains and taps on a regularly scheduled basis.

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6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable as necessary on any matter concerning this safety policy and procedure. Additionally, Safety and Loss Control will assist in developing or securing required training.

Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased air compressor storage tanks comply with current safety regulations.

Safety Engineers will provide consultative service and audit assistance to ensure effective implementation of this safety policy and procedure.

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APPENDIX A: Air Compressor Storage Tank Checklist

Air Compressor Storage Tank Location _____

Air Compressor Storage Tank ID# _____

Air Compressor Storage Tank Manufacturer ID# _____

Maximum allowable working pressure of the air compressor storage tank (PSI) _____

Yes No

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Are all drains, handles, and manholes easily accessible? |
| <input type="checkbox"/> | <input type="checkbox"/> | Is a drain pipe and valve installed on the lowest point of the air compressor storage tank? |
| <input type="checkbox"/> | <input type="checkbox"/> | Is the drain valve opened and frequently drained to prevent the accumulation of excessive amounts of liquids? |
| <input type="checkbox"/> | <input type="checkbox"/> | Does the air compressor storage tank have a pressure gauge? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do the safety valves operate to prevent the internal tank pressure from exceeding 10% beyond the maximum allowable working pressure of the air compressor tank? |

Compressed Gas Cylinders

SPP# 1910.101

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the protection and safety of North Carolina Department of Transportation (NCDOT) employees who handle and use compressed gases.

2.0 Scope and Applicability

Compressed gases are typically stored under pressure in metal cylinders. These cylinders are designed and constructed to withstand high pressures. Improper handling and use of compressed gases can result in devastating consequences.

This safety policy and procedure provides guidelines for the safe handling and use of compressed gases. It includes provisions for training and presents safe handling guidelines. It also presents the types, uses, inspection, and marking requirements of compressed gas cylinders. Additionally, this safety policy and procedure presents transportation and storage requirements for compressed gas cylinders.

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This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, Purchasing, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any employee who as a result of his or her job duties is exposed to or handles compressed gas cylinders.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.101-104).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, compressed gas cylinders will not be handled until employees have been trained concerning their use. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Compressed Gas Cylinders will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Compressed Gas Cylinders. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's safety policy and procedure on Compressed Gas Cylinders.

6.1 Definitions

Compressed Gas (Nonliquefied)

A gas, other than a gas in solution, which under the charging pressure is entirely gaseous at a temperature of 70°F.

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Cylinder

A portable compressed gas container, fabricated to or authorized for use by the U.S. Department of Transportation (DOT), or fabricated to Transport Canada (TC) or the “Rules for the Construction of Unfired Pressure Vessels,” Section VIII, ASME *Boiler & Pressure Vessel Code*.

Flammable Gas

A gas that is flammable in a mixture of 13 percent or less (by volume) with air, or the flammable range with air is wider than 12 percent regardless of the lower limit, at atmospheric temperature and pressure.

Handling

Moving, connecting, or disconnecting a compressed or liquefied gas cylinder.

Inside Diameter (I.D.)

Inside cylinder diameter.

Liquefied Gas

A gas, which under charging pressure, is partially liquid at a temperature of 20°C (70°F).

Nonflammable Gas

A gas that does not meet the definition of a flammable gas.

Outside Diameter (O.D.)

Outside cylinder diameter.

Oxidizing Gas

A gas that can support and accelerate combustion of other materials.

Safety Relief Device

A device intended to prevent rupture on a cylinder under certain conditions of exposure.

Standard Cubic Foot (SCF)

One cubic foot of gas at 70°F (21°C) and 14.7 psia (an absolute pressure of 101 kilopascals [kPa]).

Storage

An inventory of compressed or liquefied gases in containers that are not in the process of being examined, serviced, refilled, loaded, or unloaded.

Toxic Gas

A gas having a health hazard rating of 3 or 4 defined in NFPA 704, *Standard System for the Identification of the Fire Hazards of Materials*.

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Use

The consumption of a compressed or liquefied gas in a nonrecoverable manner.

User

An individual, group, or organization who utilizes the compressed or liquefied gas in a nonrecoverable manner.

Valve Protection Device

A device attached to the neck ring or body of the cylinder for the purpose of protecting the cylinder valve from being struck or damaged from impact resulting from a fall or an object striking the cylinder.

Valve Protective Cap

A rigid, removable cover provided for compressed gas container valve protection.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- General Safe Handling Guidelines
- Types
- Use
- Inspection
- Marking
- Transportation
- Storage
- Cylinder Protection
- Service

6.2.1 Training

Employees who use and handle compressed gas cylinders will be trained before initial job assignment and/or job reassignment. Employees will be trained in the safe use, inspection, handling, and storage of compressed gas cylinders. Refresher training shall be provided at the discretion of the supervisor.

6.2.2 General Safe Handling Guidelines

Serious accidents can result from the misuse, abuse, or mishandling of compressed gas cylinders. Employees assigned to the handling of cylinders under pressure should follow general safe handling guidelines. Appendix A presents these guidelines. Figure 1 presents the typical components of a compressed gas cylinder.

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6.2.3 Types

Compressed gas cylinders are used for a variety of gases in NCDOT. These gas cylinders fall into the following categories:

- Flammable
- Toxic and Poison
- Liquid

The flammable gas cylinder predominantly used in NCDOT is acetylene. Acetylene is used in torch heating, welding, and ferrous metal cutting operations.

Toxic and poison gas cylinders are used in a variety of applications within NCDOT. Methyl Bromide is the most common of these gas cylinders. These cylinders should be marked with a poison gas label.

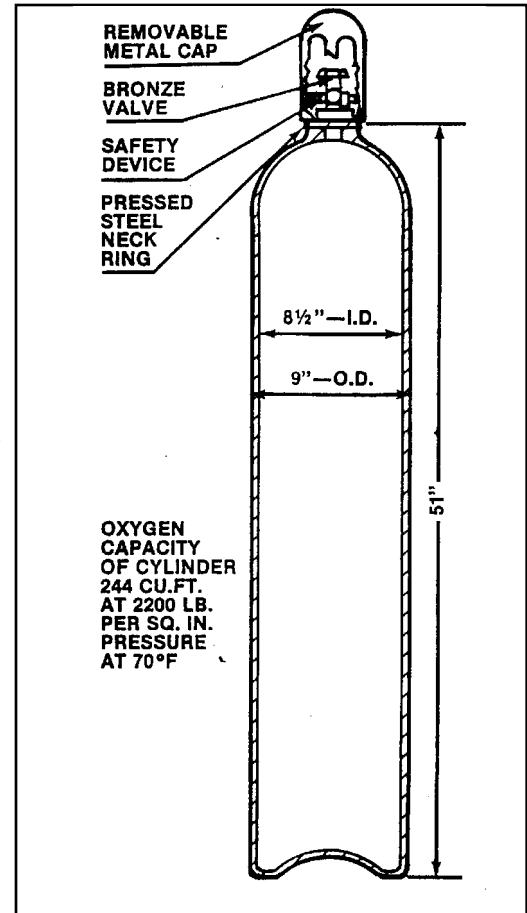


Figure 1

6.2.4 Use

Compressed gas cylinders are used for variety of purposes in NCDOT. Compressed gas cylinders in NCDOT are commonly used in metal cutting operations. Cylinders should be handled carefully and only used for their designated purpose. See [SPP# 1910.252, Welding](#), for additional related information.

6.2.5 Inspection

Compressed gas cylinders should be visually inspected daily for leaks, cracks, etc. This visual inspection will include the cylinder, safety relief devices, valves, protection caps and stems. If a cylinder is thought to be defective, it should be returned to the supplier for replacement. Under no circumstances should employees attempt to repair defective cylinders. Gages should be checked to ensure that the gas under pressure is not left in hoses when operations are completed.

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6.2.6 Marking

For the purpose of identifying the gas content, compressed gas cylinders shall be legibly marked with either the chemical or trade name of the gas. Such marking shall be by means of stenciling, stamping, or labeling, and shall not be readily removable. Whenever practical, the marking shall be on the shoulder of the cylinder for easy identification.

6.2.7 Transportation

Transporting gas cylinders requires careful consideration and appropriate precautions. These considerations and precautions include:

- Motor vehicle transport of cylinders
- Flammable gas and oxidizer cylinders transport
- Hand truck (dolly) transport of cylinders
- Cylinder transport precautions

Motor vehicle transport of cylinders shall only be done with vehicles equipped with racks or other means of securing the cylinders. Cylinders containing liquefied hydrogen or toxic gases shall be transported in open body vehicles.

Flammable gas and oxidizer cylinders transport must not be done together nor with poisons or corrosives. However, oxygen and acetylene cylinder joint transport is allowed if:

- The cylinders are transported in the rear truck bed below the cab level
- A roll bar is installed over the rear truck bed to prevent the cylinders from falling out of the truck bed in the event of the vehicle overturning

Red label, yellow label, white label, green label, or poison label materials are not to be transported on the same load. Poison label materials are not to be transported with food or other items intended for human consumption.

Hand truck (dolly) transport of cylinders shall be used for the transfer of compressed gas cylinders from loading area to shop or laboratory or other within-building transfers.

Cylinder transport precautions include:

- Cylinders having the valve protection cover in place while being transported (inter- and intra-building transport)
- Cylinders not being rolled or lifted by the valve or valve cap for moving
- Cylinder valves being shut off and valve caps in place during transit from location to location
- Cylinders that are dropped during transit being taken out of service and returned to the supplier for inspection

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- Cylinders being securely supported at all times during transport
- Smoking being prohibited during loading, unloading, and hand transportation of flammable gas cylinders

6.2.8 Storage

The storage of compressed gas cylinders requires some basic precautions and guidelines. These include:

- General cylinder storage precautions
- Specific gas cylinder storage guidelines
- Cylinder storage room guidelines

General cylinder storage precautions include:

- Cylinders being secured in an upright position in a safe, dry, well-ventilated place prepared and reserved for the purpose
- Cylinders not being kept in unventilated enclosures such as lockers
- Cylinders not being stored in the same area as flammable substances, such as oil and volatile liquids or near sources of heat, such as radiators or furnaces
- Cylinders not being stored near elevators, gangways, stairwells, or other places where they can easily be knocked down or damaged
- Cylinders being stored on a level fireproof floor
- Cylinders stored in the open being protected from contact with the ground and against extremes of weather
- Cylinder storage being planned so that cylinders are used in the order that they are received from the supplier
- Empty and full cylinders being stored separately, with empty cylinders being plainly identified as such to avoid confusion
- Empty cylinders being grouped together that have held the same contents

Specific gas cylinder storage guidelines includes additional precautions and guidelines for oxygen, hydrogen, and acetylene and liquefied fuel gas cylinders.

Oxygen cylinders should not be stored within 20 feet (6 meters) of highly combustible materials, oil, grease, wood shavings, or cylinders containing flammable gases. (However, for NCDOT operations, oxygen and acetylene are typically paired on a common transfer cart for use.) If closer than 20 feet, cylinders should be separated by a wall with a fire-resistance rating of at least 30 minutes.

Hydrogen cylinders storage locations shall be permanently placarded as follows: “HYDROGEN-FLAMMABLE GAS-NO SMOKING-NO OPEN FLAMES,” or equivalent.

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Acetylene and liquefied fuel gas cylinders should be stored with the valve end up. If storage is within 100 feet (30.5 meters) of each other and not protected by automatic sprinklers, the total capacity of acetylene cylinders stored and used inside the building should be limited to 2,500 ft³. Acetylene storage areas must be well ventilated and open flames must be prohibited. Acetylene storage rooms should have no other compressed gases.

Cylinder storage room guidelines include:

- Storage rooms for cylinders containing flammable gases being well ventilated to prevent the accumulation of explosive concentrations of gas
- No ignition sources being permitted
- Smoking being prohibited
- All permanent wiring being in conduit
- Electric lights (portable and fixed) being equipped with guards to prevent breakage
- Electric switches being located outside the room

6.2.9 Cylinder Protection

All gas cylinders with a water capacity of over 30 pounds shall be equipped with a valve protection cap or with a collar or recess to protect the valve. In addition, cylinders shall be maintained with the protective cap in place at all times unless in use.

6.2.10 Service

Cylinder service, modifications or repairs will be performed by an authorized individual other than a NCDOT employee. Any damaged or faulty equipment will be repaired or replaced by the service representative. Cylinder valves that cannot be opened by hand will not be forced open with tools and will be returned to the supplier for service.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of compressed gas cylinder equipment and related supplies. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

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Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to handle any compressed gas cylinders.

Supervisors will also note defective cylinders and tag them for repair.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure. They shall report any defective or damaged cylinders to their supervisor.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased compressed gas cylinders equipment and supplies comply with current safety regulations and this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will maintain an inventory of related parts and supplies for compressed cylinders.

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APPENDIX A: Compressed Gas Cylinders Safe Handling Guidelines

- Accept only cylinders approved for use in interstate commerce for transportation of compressed gases.
- Do not remove or change the marks and numbers stamped on the cylinders.
- Cylinders must never be dragged, pushed, or pulled across the floor.
- Transport cylinders weighing more than a total of 40 pounds (18.2 kg) on a hand or motorized truck, securing them from falling.
- Keep the cylinders clean and protect them from cuts or abrasions.
- Do not lift compressed gas cylinders with an electromagnet. Where cylinders must be handled by a crane or derrick, as on construction jobs, carry them in a cradle or suitable platform and take extreme care that they are not dropped or bumped. Do not use slings.
- Do not drop cylinders or allow them to strike each other violently.
- Do not use cylinders for rollers, supports, or any purpose other than to contain gas.
- Do not tamper with safety devices in valves or on cylinders.
- Consult the supplier of the gas when in doubt about the proper handling of a compressed gas cylinder or its contents.
- Clearly write EMPTY in chalk on empty cylinders that are to be returned to the vendor.
- Close cylinder valves and replace valve protection caps, if the cylinder is designed to accept a cap.
- Load cylinders to be transported to allow as little movement as possible. Secure them to prevent violent contact or upsetting.
- Always consider cylinders to be full and handle them with corresponding care.
- Securely support compressed gas cylinders at all times. Cylinders must not be left “free-standing” at anytime, e.g., cylinders unloaded from truck to loading dock must be secured until placed on a hand truck for delivery within the building.
- Compressed gas cylinders should never be subjected to a temperature above 125°F.
- Never place cylinders where they might become part of an electrical circuit.
- Do not re-paint cylinders.
- Never use a flame to detect flammable gas leaks. Always use soapy water.

Diving Operations

SPP# 1910.401

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the protection and safety of North Carolina Department of Transportation (NCDOT) employees who perform diving operations.

2.0 Scope and Applicability

Underwater diving operations can present substantial risks to employees who perform diving if safe practices and procedures are not followed. Underwater obstructions and improper diving techniques can present hazards to NCDOT employees who perform diving operations.

This safety policy and procedure will aid NCDOT employees who perform diving operations. It includes provisions for training and a listing of general dive team requirements. Procedures are presented for pre-dive activities, dive activities, and post-dive activities. Additionally, information is presented on SCUBA diving, surface-supplied air diving, and liveboating. Equipment and recordkeeping requirements are also detailed.

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This document also details the areas of responsibility for managers/unit heads, supervisors, employees, dive team members, designated person-in-charge, Bridge Maintenance Unit, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects any bridge employee who as a result of job duties is involved in diving operations.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.401-441) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.1071-1092).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, diving operations will not be performed until all hazards are eliminated or minimized. When diving hazards exist that cannot be eliminated, engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Diving will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Diving. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to the supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Diving.

6.1 Definitions

Acfm

Actual cubic feet per minute.

Bottom Time

The total elapsed time measured in minutes from the time the diver leaves the surface in descent to the time the diver begins ascent.

Bursting Pressure

The pressure at which a pressure containment device would fail structurally.

Cylinder

A pressure vessel for the storage of gases.

Decompression Sickness

A condition with a variety of symptoms which may result from gas or bubbles in the tissue of divers after pressure reduction.

Decompression Table

A profile or set of profiles of depth-time relationships for ascent rates and breathing mixtures to be followed after a specific depth-time exposure or exposures.

Dive Location

A surface or vessel from which a diving operation is conducted.

Dive Team

Divers and support employees involved in a diving operation, including the designated person-in-charge.

Diver

An employee working in water using underwater apparatus which supplies compressed breathing gas at the ambient pressure.

Diver-Carried Reserve Breathing Gas

A supply of air or gas sufficient under standard operating conditions to allow the diver to reach the surface or another source of breathable air.

Diving Mode

A type of diving requiring specific equipment, procedures, and techniques.

Fsw

Feet of sea water (or equivalent static pressure head).

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Liveboating

The practice of supporting a surface-supplied air or mixed gas diver from a vessel which is underway.

SCUBA Diving

A diving mode independent of surface supply in which the diver uses open circuit self-contained underwater breathing apparatus.

Standby Diver

A diver at the dive location available to assist other divers.

Umbilicals

The composite hose bundle between a dive location and a diver or bell, or between a diver and a bell, which supplies the diver or bell with breathing gas, communications, power or heat.

Working Pressure

The maximum pressure to which a pressure containment device may be exposed under standard operating conditions.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- General Requirements
- Pre-Dive Procedures
- Procedures During Dive
- Post-Dive Procedures
- SCUBA Diving
- Surface-Supplied Air Diving
- Liveboating
- Equipment
- Recordkeeping

6.2.1 Training

NCDOT employees will have the experience or training necessary to perform assigned tasks in a safe manner. Dive supervisors are responsible for ensuring all dive team members receive the following training in:

- The proper use of equipment and tools
- The techniques of the assigned diving mode
- Dive operations and emergency procedures
- Cardiopulmonary Resuscitation (CPR) and first aid
- Physics or physiology for those exposed to or who control the exposure of others to hyperbaric conditions

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6.2.2 General Dive Team Requirements

Supervisors will assign tasks to dive team members in accordance with training and experience. All training will be supervised to ensure competency and accuracy in the given assignments.

No employee will be asked to perform dives that are inconsistent with their level of training.

NCDOT will provide at each dive location a Safe Practice Manual. This manual will be available to each dive team member and contain the following information:

- A copy of this safety policy and procedure
- Safety procedures and checklist for diving operations
- Assignments and responsibilities of the dive team members
- Equipment procedures and checklists
- Emergency procedures for fire, equipment failure, adverse environmental conditions, and illness and injury

6.2.3 Pre-Dive Procedures

The following equipment and information will be provided at each dive location for all employees to review prior to the dive. Supervisors are responsible for ensuring this information is available and accurate.

- A list of emergency aid facilities, hospitals, available physicians, and transportation available at the location
- The nearest U.S. Coast Guard Rescue Coordination Center
- A physician-approved first aid kit consistent with the dangers posed by diving
- An American Red Cross standard first aid handbook or its equivalent
- A bag-type manual resuscitator with transparent mask and tubing

Planning a diving operation will include an assessment of the safety and health aspects of:

- Diving mode
- Surface and underwater conditions and hazards
- Breathing gas supply (including reserves)
- Thermal protection
- Diving equipment and systems
- Dive team assignments and physical fitness of dive team members including any known impairments
- Repetitive dive designation or residual inert gas status of dive team members

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- Decompression and treatment procedures (including altitude corrections)
- Emergency procedures

All dive team members will be briefed on the task to be undertaken, procedures for the diving mode, any unusual hazards, and any modifications to operating procedures necessitated by the specific diving operation.

The breathing gas supply system, including reserve breathing gas supplies, masks, helmets, and thermal protection will be inspected for defects and proper operation prior to each dive.

When diving from surfaces other than vessels in areas capable of supporting marine traffic, a rigid replica of the international code flag will be used to warn marine traffic of the dive location. In addition, any operation involving night diving will include an illuminated flag.

6.2.4 Procedures During Dive

The following dive procedures will be outlined prior to the dive and all dive members will be trained in the proper methods and use of equipment:

- A ladder or platform capable of supporting the diver will be provided for safely entering and exiting the water. The ladder or platform will extend below the water surface to ensure a proper foot and hand-hold.
- A means will be provided to assist injured divers onto the vessel and out of the water.
- An operational two-way communication system will be available at each dive location to obtain emergency assistance. In addition, a communication system will be used between each surface-supplied air or mixed gas diver and a dive team member at the dive location.
- Dive profiles for each diver will be maintained including depth-time, gas change schedules, and decompression tables if necessary.
- Decompression, repetitive, and no decompression tables (as appropriate) shall be at each dive location.
- Power tools will be de-energized prior to entry or removal from the water.
- Welding and burning current will be supplied with a switch to interrupt the current flow. The switch shall be tended by a dive team member in voice communication with the diver performing the welding or burning.
- Welding equipment will be properly grounded to prevent shock hazards.
- Welding cables and equipment will be maintained in excellent condition.

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- Welders will be provided with insulating gloves.
- Explosives will be handled only by qualified employees and according to NCDOT's Safety Policy and Procedure on Explosives.

All dives will be terminated when any of the following situations occur:

- A diver requests termination
- A diver fails to answer or respond correctly to communications or signals from a dive team member
- Communication is lost and cannot be quickly re-established
- A diver begins to use diver-carried reserve breathing gas or the dive location reserve breathing gas

6.2.5 Post-Dive Procedures

After any dive, the supervisor at the dive location will complete the following post-dive procedures:

- Check the physical condition of each diver
- Instruct the diver to report any physical problems
- Alert the diver to the potential hazards of flying after diving

For each dive performed, a record will be maintained which includes the following:

- Names of dive team members and the supervisor in charge
- Date, time, and location of dive
- Diving modes used
- General nature of work performed
- Approximate underwater time and water conditions
- Maximum depth and bottom time for each diver

6.2.6 SCUBA Diving

When SCUBA diving, the following rules will be observed:

- Diving will not be conducted at depths greater than 130 fsw
- Diving will not be conducted at depths greater than 100 fsw unless a decompression chamber is available
- Diving will not be conducted against currents exceeding one knot unless line-tended or enclosed
- A standby diver will be on location while a diver is in the water
- A diver will be line-tended or accompanied by another diver in continuous visual contact in water depths greater than 6 feet
- A diver will be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces
- A diver-carried reserve breathing gas supply will be provided for each diver consisting of:

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- A manual reserve (J valve) or
- An independent reserve cylinder with a separate regulator or connected to the underwater breathing apparatus
- The valve of the reserve breathing apparatus being in the closed position prior to the dive

6.2.7 Surface-Supplied Air Diving

The following rules will be observed when using surface-supplied air:

- Surface-supplied air diving will be limited to a depth of 190 fsw
- A decompression chamber will be provided for dives exceeding 100 fsw
- Each diver will be continually tended while diving
- A diver will be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces
- Each operation will have a primary breathing gas supply sufficient to support divers for the duration of the planned dive including decompression if applicable
- A diver-carried reserve breathing gas supply will be provided except when heavy gear is worn or where physical space does not permit
- A standby diver will be on location while a diver is line-tended in the water

6.2.8 Liveboating

The following will be observed when performing liveboating operations:

- Liveboating will not be allowed in rough seas which significantly impede diver operation
- Liveboating will only be conducted in daylight hours
- The propeller will be stopped prior to divers entering the water
- A device will be used to minimize the possibility of hose entanglement in the prop
- Two-way voice communication will be used between the vessel operator and the designated person-in-charge
- A standby diver will be available while a diver is in the water
- A diver-carried reserve breathing gas supply will be used by each diver

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6.2.9 Equipment

Each piece of equipment will be maintained in excellent working condition and inspected and tested prior to each dive. Typical dive equipment includes:

- Air compressor
- Hoses
- Umbilicals
- SCUBA tanks
- Gauges
- Masks and helmets
- Weight belts and safety harnesses
- Flotation devices

Any modifications or repairs will be logged indicating the type of repair performed, the date of the repair, and the initials of the person performing the repairs.

Air compressors will be fitted with a volume tank with a check valve on the inlet side, a pressure gauge, a relief valve, and a drain valve. Each compressor will also comply with the following requirements:

- Each inlet will be located away from areas containing exhaust gas or other contaminants
- Respirable air from the air compressor that is supplied to a diver will contain:
 - A level of carbon monoxide no greater than 20 ppm
 - A level of carbon dioxide no greater than 1,000 ppm
 - A level of oil mist not greater than 5 milligrams per cubic meter
 - No noxious or pronounced odor
- The outlet of the air compressor system will be tested for air purity every 6 months

Hoses will have a rated bursting pressure at least equal to 4 times the working pressure. Hoses will be tested at least annually to 1.5 times their working pressure. All hoses will have the ends taped, capped, or plugged when not in use.

Hose connectors will be made of corrosion-resistant material and be designed in such a way as to prevent accidental disengagement.

Umbilicals will be marked in 10-foot increments to 100 feet beginning at the diver's end, and in 50 foot increments thereafter.

SCUBA tanks will be stored in a secure manner to prevent falling or being knocked over. These tanks are not provided with valve caps.

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Gauges indicating diver depth will be used for all dives except SCUBA dives. Each gauge will be deadweight tested or calibrated against a master reference gauge every 6 months. Also, these gauges will be tested when there is a discrepancy greater than 2 percent of full scale between any 2 equivalent gauges.

Each SCUBA diver will wear a cylinder pressure gauge capable of being monitored by the diver during the dive.

Masks and helmets for surface supplied air and mixed-gas will be equipped with an exhaust valve and a non-return valve. These valves will be located at the attachment point between the helmet or mask and hose and will close readily and positively. Masks and helmets will have a minimum ventilation rate of 4.5 acfm at any depth at which they are operated.

Weight belts and safety harnesses will be provided to each diver. The weight belt or assembly will be capable of quick release. A safety harness with a positive buckling device and with an attachment point will be worn, except when heavy gear or SCUBA equipment is used.

Except when heavy gear is worn or when SCUBA diving, a safety harness will be worn with a positive buckling device and an attachment point.

Flotation devices capable of being inflated and maintaining the diver at the surface in a face-up position will be used in SCUBA diving. This inflatable flotation device will have a manually activated inflation source independent of the breathing supply, an oral inflation device, and an exhaust valve. A buoyancy compensator will have an inflation source separate from the breathing gas supply.

6.2.10 Recordkeeping

If an employee is injured and as a result of the injury is hospitalized for 24 hours or more, a report outlining the incident and the extent of any injuries suffered in the accident is required. Additionally, all recordkeeping requirements outlined in NCDOT's safety program are also applicable.

These records will be maintained at the division office for review by NCDOT accident investigators, at the request of employees' designated representative, or any state agency authorized to view such documents.

All records will be maintained on file for a period of 5 years, with the exception of the Safe Practice Manual which will be replaced as changes in equipment or procedures are implemented.

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6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of diving equipment and related supplies in their areas. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors are responsible for ensuring that employees do not perform diving activities unless they have been trained. Supervisors will also assign tasks to dive team members in accordance with training and experience.

Supervisors on the dive team will be designated as the person-in-charge. Supervisors will be responsible for all aspects of the dive operation and will be present at each dive location to ensure dive team members' safety. They are also responsible for ensuring that all the pre-dive and post-dive procedures are performed.

Supervisors will also ensure that all diving equipment is properly inspected and maintained. Any defective diving equipment will be identified and removed from service for repair.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.4 Dive Team Members

Dive team members are responsible for complying with all the applicable provisions of this safety policy and procedure. They will report any unsafe condition immediately to their supervisor at any point in a dive operation.

Dive team members are responsible for inspecting their dive equipment prior to use and following good maintenance practices for the care of their diving equipment.

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6.3.5 Bridge Maintenance Unit

Bridge maintenance unit will be responsible for providing technical guidance and assistance to diving operations and assist in developing or securing the required training. They will also work with Purchasing and Central Equipment Unit to ensure that the proper equipment is made available for diving operations and complies with this safety policy and procedure and current safety regulations.

Bridge Maintenance Unit will also be responsible for maintaining and updating the Safe Practice Manual. This manual should be updated as equipment and procedures change.

6.3.6 Safety and Loss Control

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Electrical Related Safe Work Practices **SPP# 1910.301**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures for North Carolina Department of Transportation (NCDOT) employees who may be exposed to electrically related hazards.

2.0 Scope and Applicability

Electrical accidents are generally caused by unsafe conditions, unsafe acts, or combinations of the two. Some unsafe electric equipment and installations can be identified by the presence of faulty insulation, improper grounding, loose connections, defective parts, ground faults in equipment, or unguarded live parts.

Environments containing flammable vapors, liquids, or gases, areas containing corrosive atmospheres, and wet and damp locations are some unsafe environments affecting electrical safety. Some unsafe acts such as the failure to de-energize electrical equipment when it is being repaired or inspected, the intentional use of defective and unsafe tools, or the use of tools or equipment too close to energized parts are all contributors to electrical hazards.

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This safety policy and procedure provides guidelines for safely working around electrical hazards. It includes provisions for training, lockout/tagout requirements, and discussions of why safety related work practices are required. Guidelines are also presented for specific types of work practices and the required precautionary practices when using portable electric equipment and while being in hazardous locations. Additionally, it presents examples of labels, signs, and marking requirements.

This document details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects the following job classifications within NCDOT:

- Bridge Maintenance Technicians
- Traffic Control Technicians
- Bridge Maintenance Electricians
- Any other NCDOT Electricians

The following job classifications may be affected by this safety policy and procedure if they are exposed to parts of electrical circuits operating at 50 volts or more:

- Electrical and Electronic Engineers
- Electric and Electronic Equipment Assemblers
- Electric and Electronic Technicians
- Machine Operators
- Material Handling Equipment Operators
- Mechanics and Repairers
- Painters
- Riggers

Additionally, any other employee who as a result of his or her job duties is exposed to electrical related hazards is also affected by this safety policy and procedure.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.301-335) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.400-417).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public.

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Therefore, as a minimum, these requirements will be followed in NCDOT:

- Power equipment will be plugged into wall receptacles with power switches in the off position.
- Electrical equipment will be unplugged by grasping the plug and pulling. Cords will never be pulled or jerked to unplug the equipment.
- Frayed, cracked, or exposed wiring on equipment cords must be corrected.
- “Cheater plug,” extension cords with junction box receptacle ends, or other jerry-rigged equipment will not be used.
- Temporary or permanent storage of materials must not be allowed within three feet of any electrical panel or electrical equipment.
- Any electrical equipment causing shocks must be tagged with a “DANGER-DO NOT USE” label or equivalent.

When electrical hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Electrical Related Safe Work Practices will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT’s safety policy and procedure on Electrical Related Safe Work Practices. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides definitions, establishes general provisions, and identifies specific responsibilities as required by NCDOT’s safety policy and procedure on Electrical Related Safe Work Practices.

6.1 Definitions

Classified Location

Locations which are classified depending on the properties of the flammable vapors, liquids or gases, or combustible dusts or fibers which may be present and the likelihood that a flammable or combustible concentration or quantity is present.

Electrical Hazards

Any risk of electrical shock that is not reduced to a safe level by the electrical installation.

Exposed

Part of any electrical circuit that is capable of being inadvertently touched or having an unsafe approach distance for an individual.

Ground

A conducting connection, whether intentional or accidental, between an electrical circuit or equipment and the earth, or to some conducting body that serves in place of the earth.

Ground-Fault Circuit-Interrupter (GFCI)

A device whose function is to interrupt the electric circuit to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device (fuse or circuit breaker) of the supply circuit.

Qualified Person

Those persons who are permitted to work on or near exposed energized parts and are trained in electrical safe work practices.

Safety Related Work Practices

Skills and techniques used to safely perform work activities near or on electrical equipment.

Wet Location

Installations underground or in concrete slabs or masonry in direct contact with the earth, and locations subject to saturation with water or other liquids, such as vehicle washing areas, vehicle service areas, and locations unprotected and exposed to weather.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. The provisions adopted by NCDOT are:

- Training
- Lockout/Tagout Requirements
- Safety Related Work Practices
- Portable Electric Equipment
- Hazardous Locations
- Protective Equipment
- Labels, Signs, and Markings

6.2.1 Training

It is the responsibility of each exposed employee's immediate supervisor to ensure that the employee has received the training necessary to safely perform his or her duties. This training will be given via classroom and on-the-job instruction and is to be documented.

Exposed employees shall be trained in and familiar with the safety related work practices required by 29 CFR Part 1910 section 331 through 335, and safety related work practices contained within the National Electric Code as they pertain to their respective job assignments. Additional training requirements for Qualified Persons are also mandated.

Employees will be trained in specific hazards associated with their potential exposure. This training will include isolation of energy, hazard identification, premises wiring, connection to supply, generation, transmission, distribution installations, clearance distances, and emergency procedures.

Qualified Persons shall, at a minimum, be trained in and familiar with:

- The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
- The skills and techniques necessary to determine the nominal voltage of exposed live parts.
- The clearance distances specified in Appendix A and the corresponding voltage to which the qualified person will be exposed.

6.2.2 Lockout/Tagout Requirements

All electrical energy sources must be locked out or tagged out or both when any employee is exposed to direct or indirect contact with parts of fixed electrical equipment or circuits. Refer to [SPP# 1910.147, Control of Hazardous Energy \(Lockout/Tagout\)](#), for additional detail.

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6.2.3 Safety Related Work Practices

Safety related work practices will be used to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts. Safety related work practices will be consistent with the nature and extent of the associated electrical hazards.

Specific types of work practices covered by this safety policy and procedure include:

- Working with De-energized Parts
- Working with Energized Parts
- Vehicular and Mechanical Equipment near Overhead Lines and Underground Lines
- Illumination
- Conductive Materials and Equipment
- Portable Ladders
- Housekeeping

Appendix B details these specific work practices. Appendix C provides an electrical inspection checklist to assess electrical hazards in your workplace.

6.2.4 Portable Electric Equipment

All portable electric equipment will be handled in such a manner that will not damage or reduce service life. Flexible cords connected to equipment may not be used for raising or lowering equipment and will not be used if damage to the outer insulation is present. Additionally, visual inspections are required and unauthorized alterations of the grounding protection are not allowed to ensure the safety of employees.

Prior to each shift, a visual inspection will be performed for external defects and for possible internal damage.

Attachment plugs and receptacles may not be connected or altered which would prevent proper continuity of the equipment grounding conductor. In addition, these devices may not be altered to allow the grounding pole of a plug to be inserted into slots intended for connection to the current-carrying conductors.

6.2.5 Hazardous Locations

Portable electric equipment and flexible cords used in highly conductive work locations or in job locations where employees are likely to contact water or conductive liquids shall be approved by the manufacturer for those locations. The hazardous locations that employees should be aware of include, wet locations and locations where combustible or flammable atmospheres are present.

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For wet locations, employees' hands will not be wet when plugging and unplugging energized equipment. Energized plug and receptacle connections will be handled only with protective equipment if the condition could provide a conductive path to the employee's hand (if, for example, a cord connector is wet from being immersed in water). In addition, ground-fault circuit interrupters (GFCI) protection is required for some equipment/locations and is also recommended for use in all wet or highly conductive locations.

For combustible/flammable atmospheres, all electric equipment and wiring systems in classified locations must meet The National Electric Code requirements for that particular classification. See Appendix D for definitions of Classified Locations.

6.2.6 Protective Equipment

Employees working in areas where there are potential electrical hazards will be provided with and use protective equipment that is appropriate for the work to be performed.

Examples of Personal Protective Equipment (PPE) which might be needed for protection against electric shock include but are not limited to:

- Nonconductive hard-hats, gloves, and foot protection or insulating mats
- Eye and face protection whenever there is danger from electric arcs or flashes
- Insulated tools or handling equipment
- Protective shields and barriers to protect against electrical shock and burns

Additionally, other ways of protecting employees from the hazards of electrical shock will be implemented, including insulation and guarding of live parts. Insulation provides an electrical barrier to the flow of current. The insulation must be appropriate for the voltage and the insulating material must be undamaged, clean, and dry. Guarding prevents the employee from coming too close to energized parts. It can be in the form of a physical barricade or it can be provided by installing the live parts out of reach from the working surface. For additional detail, refer to [SPP# 1910.137, Electrical Protective Devices](#).

6.2.7 Labels, Signs, and Markings

Barricades, safety signs, safety symbols, or accident prevention tags (see Figure 1) will be used where necessary to warn and protect employees from contact with electrical hazards.

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Electrical equipment may not be used unless the manufacturer's name, trademark, or other descriptive marking is placed on the equipment.

Other markings shall be provided giving voltage, current, or wattage. The marking shall be of sufficient durability to withstand the environment involved.



Figure 1

Covers for boxes shall be permanently marked "HIGH VOLTAGE." The marking shall be on the outside of the box cover and shall be readily visible and legible. See Figure 2 for a sample sign.

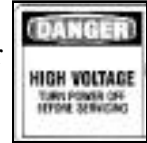


Figure 2

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funding is available to provide proper equipment, supplies, and training for exposed employees. They will also be responsible for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors are responsible for ensuring that only qualified employees are assigned or permitted to perform work directly on energized parts of equipment.

Supervisors are also responsible for ensuring that employees in their charge will comply with the requirements and responsibilities of this safety policy and procedure.

Supervisors are responsible for ensuring areas around electrical equipment, such as circuit breaker panels, disconnects, and fixed power tools, are kept free from stored items, debris, and any liquids or material that would create slippery floors or obstruct access to the equipment for maintenance or emergencies.

Supervisors are responsible for ensuring that a list of all energized equipment including isolation points and procedures for safe operation are developed for review by employees or regulating agencies.

SAFETY POLICY & PROCEDURE

6.3.3 Employees

Each employee will comply with this safety policy and procedure. It is the responsibility of each employee to identify potential hazards when required to work with or near sources of electrical energy.

Employees will not perform work involving exposure to potentially hazardous levels of electrical energy without instruction/training specific to the hazards of the tasks.

Employees shall practice good housekeeping and observe activities that could cause electrical shock hazards.

Good housekeeping will include but is not limited to:

- Not having water on floors near electrical equipment
- Not storing tools or other materials around electrical panels or equipment disconnects
- Not cleaning tools and electrical equipment with solvents

Employees will report suspected hazards to their supervisors immediately.

Employees are also responsible for performing daily visual inspections of all portable electric equipment to be used during that work shift.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

SAFETY POLICY & PROCEDURE

APPENDIX A: Approach Distances for Qualified Employees - Alternating Current

Voltage Range (phase to phase)	Minimum Approach Distance
300V and less	Avoid Contact
Over 300V, but less than 750V	1 ft. 0 in. (30.5 cm)
Over 750V, but less than 2kV	1 ft. 6 in. (46 cm)
Over 2kV, but less than 15kV	2 ft. 0 in. (61 cm)
Over 15kV, but less than 37kV	3 ft. 0 in. (91 cm)
Over 37kV, but less than 87.5kV	3 ft. 6 in. (107 cm)
Over 87.5kV, but less than 121kV	4 ft. 0 in. (122 cm)
Over 121kV, but less than 140kV	4 ft. 6 in. (137 cm)

APPENDIX B: Specific Types of Work Practices

Conductive Materials and Equipment

Conductive materials and equipment (e.g., hand tools) will be handled to prevent contact with exposed energized conductors or circuit parts. Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) will not be worn.

De-energized Parts

All electrical parts exceeding 50 volts will be de-energized before an employee works on or near equipment unless:

- The de-energizing creates a more hazardous situation
- The equipment, by design, cannot be shut down

When any employee is exposed to direct or indirect contact with parts of fixed electrical equipment or circuits which have been de-energized, the electrical energy source will be locked out or tagged out or both.

Supervisors should refer to [SPP# 1910.147 Control of Hazardous Energy \(Lockout/Tagout\)](#), for guidance on these procedures.

Energized Parts

If work must be performed while equipment is energized, additional safety measures will be taken to ensure the safety of the employee.

Protection from energized parts will be suitable for the type of hazard involved. Supervisors should refer to [SPP# 1910.137, Electrical Protective Devices](#), for additional detail.

Only Qualified Persons will be allowed to perform work directly on energized parts or equipment. Qualified Persons will be capable of working safely on energized circuits and will be familiar with special precautionary techniques, Personal Protective Equipment, insulating and shielding materials and insulated tools. Qualified Persons must also have received the training required in section 6.2.1 of this safety policy and procedure.

APPENDIX B: Specific Types of Work Practices (Continued) 2

Illumination

Employees will be provided with adequate light to work on energized equipment or equipment will be relocated to ensure adequate light is available. See [SPP# 1926.56, Illumination](#), for additional details.

Portable Ladders

Portable ladders will have nonconductive surfaces if they are used where the employee or the ladder could be exposed to electrical shock hazards. See [SPP# 1910.25, Ladders](#), for related information.

Reclosing Circuits

If circuits are tripped using a protective device such as ground fault circuit interrupter (GFCI), power will not be restored until the reason for the interruption is determined and corrected. Fuses or breakers will not be replaced or reset until it is determined that the circuit is safe to operate.

Fuses will not be replaced with higher rated fuses or with makeshift devices to bypass circuit protection as designed. Problems will be identified and promptly repaired by a qualified person.

Vehicular and Mechanical Equipment Near Overhead Power Lines

Overhead power lines will be de-energized and grounded before any work is performed by any vehicle or mechanical equipment near the energized overhead power lines. If the overhead lines can not be de-energized, then the vehicle or mechanical equipment will be operated so that a clearance of 10 feet is maintained.

If the voltage of the overhead line exceeds 50 kV, the distance will be increased 4 inches for every 10 kV increase in power. If lines are protected with properly rated insulating devices, the distance may be decreased.

If the equipment is an aerial lift insulated for the voltage involved and if the work is performed by a Qualified Person, the clearance may be reduced to a distance given in Appendix A. See [SPP# 1910.67, Aerial Truck Operations](#), and [SPP # 1910.179, Cranes](#), for related information.

If protective measures such as guarding or isolation are provided, these measures must protect the employee from contacting such lines directly with any part of the body or indirectly through conductive materials, tools, or equipment.

SAFETY POLICY & PROCEDURE

APPENDIX B: Specific Types of Work Practices (Continued) 3

Employees on the ground or in the vicinity of overhead lines will be instructed to remain clear of the equipment or any other source of energized equipment unless using properly rated Personal Protective Equipment.

SAFETY POLICY & PROCEDURE

APPENDIX C: Electrical Inspection Checklist

Facility_____

Inspector_____

Date_____

Electrical Equipment/Machinery

Test for proper grounding. All electrical equipment and machinery must be grounded effectively so that there is no potential difference between the metal enclosures. Use the voltage detector to find discrepancies and other test equipment to determine the corrective action required. Disconnects should be easily identified with the specific machinery they shut off. Disconnects should also be accessible near the machinery for use in an emergency. The disconnects should be activated periodically to be sure they are operable. All electrical connections to the equipment must be secure so that no cord or cable tension will be transmitted to the electrical terminals within the equipment. The wiring installation should be such that it is protected from damage at all times.

	OK	Needs Attention by _____ (time frame)	Needs Immediate Attention (Dangerous Condition)
Grounding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wire size	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overcurrent and Disconnects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Installation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GFCI Protection

Generally, GFCI protection is not required by the NEC on a retroactive basis. Where there is an employee exposure to potential line to ground shock hazards, GFCI protection should be provided. This is especially important in work areas where portable electrical equipment is being used in wet or damp areas in contact with earth or grounded conductive surfaces and in facilities frequented by the public, such as Welcome Centers, Rest Areas, Public Offices, Drivers License Offices, etc. Use your GFCI tester to be sure the GFCI is operable. After years of service, GFCIs can become defective and need to be replaced. Receptacles receiving GFCI protection should be labeled to inform of that fact. GFCIs should be inspected and tested monthly.

SAFETY POLICY & PROCEDURE

APPENDIX C: Electrical Inspection Checklist (Continued) 2

GFCI Protection (continued)

	OK	Needs Attention by (time frame)	Needs Immediate Attention (Dangerous Condition)
Bathrooms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crawl Spaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Basements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wet Locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Garages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pools/Tubs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Testing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Lighting

Cord and plug connected metal lamps and fixtures should be tested for grounding. Check all cord clamps for secure connections. Frayed or old cords should be replaced.

	OK	Needs Attention by (time frame)	Needs Immediate Attention (Dangerous Condition)
Grounding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plugs and Cords	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cord Clamps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Live Parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Receptacles

The receptacles should be tested for proper wiring configuration. There should be enough receptacles installed to eliminate, as much as possible, the use of extension cords. Covers should be in place and not broken. Multiple outlet adapters on a single outlet should be discouraged to prevent overloading. Surface mounted receptacle boxes should be protected from damage by mobile or motorized equipment.

	OK	Needs Attention by (time frame)	Needs Immediate Attention (Dangerous Condition)
Polarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adequate Number	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mounting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Covers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grounding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tension	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SAFETY POLICY & PROCEDURE

APPENDIX C: Electrical Inspection Checklist (Continued) 3

Service Entrance Panel

Check the branch circuit identification. It should be up to date and posted on the panel door. Be sure the panel and cable or conduit connectors are secure. The panel should be kept three feet clear of any items. No flammable materials of any kind should be stored in the same area or room. Look for corrosion and water in or around the area. Missing knockouts, covers, or openings must be covered properly to eliminate exposure to live parts.

	OK	Needs Attention by (time frame)	Needs Immediate Attention (Dangerous Condition)
Circuit ID	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Secure Mounting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knockouts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clearances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Live Parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ratings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Small Power Tools

Attachment plugs should be checked for defective cord clamps and broken or missing blades. Connection of the cord to the power tool should be secure. Use your ohmmeter to check for leakage and for an effective equipment grounding conductor.

	OK	Needs Attention by (time frame)	Needs Immediate Attention (Dangerous Condition)
Attachment Plugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cords	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clamps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grounding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Splices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

System Grounding

Check connection of the grounding electrode conductor to the metal cold water pipe and to any driven ground rod. Also check any bonding jumper connections and any supplemental grounding electrode fittings. These items should not be exposed to corrosion and should be accessible for maintenance and visual inspection.

SAFETY POLICY & PROCEDURE

APPENDIX C: Electrical Inspection Checklist (Continued) 4

System Grounding (continued)

	OK	Needs Attention by (time frame)	Needs Immediate Attention (Dangerous Condition)
Secure Connectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Corrosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wire Size	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Wiring

Temporary wiring that is being used on a permanent basis should be replaced with fixed wiring. Conduit and/or cable systems must be protected from damage by vehicles or other mobile equipment. All fittings and connections to junction boxes and other equipment must be secure. No exposed wiring can be allowed. Check for missing knockouts and cover plates. Jerry-rigged splices on flexible cords and cables should be correctly repaired. Electrical equipment should be installed in a neat and professional manner. Check for damaged insulation on flexible cord and pendant drop cords.

	OK	Needs Attention by (time frame)	Needs Immediate Attention (Dangerous Condition)
Temporary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Splices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protected	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Box Covers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Openings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fittings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Workmanship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX D: Classified Locations

Class I Locations

Those locations in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. Class I locations include the following:

Class I, Division 1

Those locations in which hazardous concentrations of flammable gases or vapors may exist under normal operating conditions; or in which hazardous concentrations of such gases and vapors may exist frequently because of repair or maintenance operations or because of leakage; or in which breakdown or faulty operation of equipment or processes might release hazardous concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment.

Class I, Division 2

Those locations in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the hazardous liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment.

Class II Locations

Those locations that are hazardous because of the presence of combustible dusts. Class II locations include the following:

Class II, Division 1

Those locations in which combustible dust is or may be in suspension in the air under normal operating conditions in quantities sufficient to produce explosive or ignitable mixtures; or where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes; or in which combustible dusts of an electrically conductive nature may be present.

Class II, Division 2

Those locations in which combustible dust will not normally be in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures, and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus.

Class III Locations

Those locations that are hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. Class III locations include the following:

Class III, Division 1

Those locations in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.

Class III, Division 2

Those locations in which easily ignitable fibers are stored or handled, except in process of manufacture.

SAFETY POLICY & PROCEDURE

APPENDIX E: Electrical Related Safe Work Practices Program Checklist

YES NO

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Has it been determined what job classifications are affected by this safety policy and procedure? |
| <input type="checkbox"/> | <input type="checkbox"/> | Have employees been characterized into the qualified and non-qualified categories? |
| <input type="checkbox"/> | <input type="checkbox"/> | Have training and education been established for the affected employees and their subsequent categories? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are there lockout/tagout requirements in place for the electrical conductors and equipment in your facility installations? |
| <input type="checkbox"/> | <input type="checkbox"/> | Has a list of all energized equipment including isolation points and procedures for safe operation been developed? |
| <input type="checkbox"/> | <input type="checkbox"/> | For portable electric equipment, are handling practices, visual inspections, conductive work locations, attachment plugs and circuits established and operational? |
| <input type="checkbox"/> | <input type="checkbox"/> | Is there a mechanism in place for reporting hazardous electrical conditions? |
| <input type="checkbox"/> | <input type="checkbox"/> | Is there a mechanism in place for employees to be rated for their performance in following Electrical Related Safe Work Practices? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are there mechanisms in place to ensure floor areas and other general areas are kept clear from items and materials that obstruct areas to equipment or that would create slippery conditions? |

Excavation, Trenching and Shoring**SPP# 1926.650****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to ensure that each North Carolina Department of Transportation (NCDOT) employee has the training and information needed to perform his or her job safely and effectively when working in or near trenches or other excavations.

2.0 Scope and Applicability

This safety policy and procedure affects any NCDOT employee whose job duties require entrance into trenches or excavation sites or inspections of such sites.

SAFETY POLICY & PROCEDURE

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.145) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.200).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards. This will be accomplished through proper training and education of its workers and by eliminating as many hazards as possible from the jobsite. Employees working in or near trenches and excavations will be provided training in recognizing and controlling unsafe conditions. All trenches and excavations will be evaluated and monitored by a “competent” person prior to employees entering and continuously while employees work within.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure that all phases of this procedure are implemented as prescribed in section 6.

6.0 Procedure

This section provides definitions, establishes general provisions and identifies specific responsibilities required by NCDOT’s safety policy and procedure on Excavations, Trenching and Shoring. (Reference Appendix A for Procedure Flow Diagram.)

6.1 Definitions

Bell Bottom Pier Hole - A type of shaft or footing excavation, the bottom of which is made larger than the cross section above, resulting in a bell shape.

Benching - A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal steps, usually with vertical surfaces between levels.

Competent Person - One who is capable of identifying existing and predictable hazards in the working area and who has authority to take prompt corrective action to eliminate them.

Cross Braces - The horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

SAFETY POLICY & PROCEDURE

Faces or Sides - The vertical or inclined earth surfaces formed as a result of excavation work.

Protective System - A method of protecting employees from trench collapse. This includes sloping, shoring, trench boxes or other systems of protection.

Ramp - An inclined walking or working surface that is used to gain access to one point from another and is constructed from earth or from structural materials such as steel or wood.

Shoring - A structure such as a metal hydraulic, mechanical or timber shoring system that supports the side of an excavation and which is designed to prevent cave-ins.

Sloping - A method of protecting employees from cave-ins by excavating all sides of an excavation to a stable incline. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable Rock - Natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against cave-in or movement by rock bolts or by another protective system that has been designed by a Registered Professional Engineer (RPE).

Support System - A structure such as underpinning, bracing, or shoring the sides of an excavation.

Tabulated Data - Tables and charts approved by a Registered Professional Engineer and used to design and construct a protective system.

Trench - A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench at the bottom is not greater than 15 feet.

Uprights - The vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with, or interconnected to each other are often called “sheeting.”

Wales - Horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members or earth.

6.2 General Provisions

The general elements of this program are found in OSHA standard 29CFR 1926.650-652 and associated appendices. These elements are adopted for use by NCDOT as follows:

6.2.1 Surface Encumbrances

All surface encumbrances, such as trees, boulders, adjacent structures, utility poles, large equipment, etc. that are located so as to create a hazard to employees will be removed or supported as necessary to safeguard employees against cave-ins.

6.2.2 Underground Installations

The location of utility installations that may be encountered during excavation work will be determined prior to opening an excavation. If underground installations are uncovered, they will be properly supported to protect employees.

6.2.3 Access and Egress

A stairway, ladder, ramp or other means of egress will be located in any trench that is 4 feet or more in depth so as to require no more than 25 feet of lateral travel for employees.

Structural ramps may be designed by a competent person unless they are used by equipment. If this is the case, the design will be developed by a competent person qualified in structural design.

6.2.4 Vehicular Traffic

Employees exposed to public vehicular traffic in a work area will wear a reflectorized vest or other high visibility clothing.

6.2.5 Falling Loads

Employees are not permitted under any loads handled by lifting or digging equipment.

Employees will stand away from any vehicle being loaded or unloaded.

6.2.6 Mobile Equipment

A warning system such as barricades, hand or mechanical signals or stop logs will be used when mobile equipment is operated near the edge of an excavation and the operator does not have a clear and direct view of the edge.

SAFETY POLICY & PROCEDURE

6.2.7 Hazardous Atmospheres

Air quality tests will be performed before employees enter any excavation where a hazardous atmosphere exists or could reasonably be expected to exist. Excavations or trenching in the vicinity of gasoline storage tanks, underground pipelines or sewer lines could reasonably be expected to cause a hazardous atmosphere.

Employees will not enter any excavation that tests as having a hazardous atmosphere.

6.2.8 Water Accumulation

Employees will not be allowed to enter excavations where water has accumulated unless precautions have been taken to protect employees against the water hazards.

6.2.9 Stability of Adjacent Structures

Support systems such as shoring, bracing or underpinning will be used to provide stability whenever the stability of adjoining buildings, walls or other structures is endangered by excavation operations.

6.2.10 Employee Protection

Whenever loose rock or soil could pose a hazard to employees by falling or rolling into an excavation, an adequate means of protection will be provided. Such protection will consist of scaling to remove loose material, installation of protective barricades, or other means of equivalent protection.

Excavated material or equipment that could pose a hazard to employees by falling or rolling into an excavation will be kept at minimum of 2 feet from the edge.

Walkways or bridges with standard guard rails will be provided whenever employees are required to cross over excavations. “Jump-overs” are prohibited.

6.2.11 Inspections

Excavations and trenches will be inspected by a competent person prior to the start of work and monitored continuously while employees are working within.

SAFETY POLICY & PROCEDURE

The competent person will conduct an inspection whenever a hazard increasing event (such as a rainstorm) occurs.

Whenever a possible hazardous condition is detected, the competent person will instruct exposed employees to immediately leave the excavation or trench until an adequate means of protection is provided.

6.2.12 Training

Employees selected to be “competent” persons for NC DOT projects will receive training on all sections of this procedure. Detailed training will also be provided on:

- Hazards associated with trenching and excavation
- Class “C” soil
- Safe slopes for different soil types and conditions
- Proper installation of shielding and shoring
- Recognition of hazardous conditions caused by machinery, traffic, utilities and weather conditions

Annual competent person refresher training regarding updates or modifications of procedures, equipment, or policy will be provided.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for coordinating required training with Safety and Loss Control.

Sufficient employees will be trained to provide a “competent” person at each excavation or trench covered by this standard.

Managers/Unit Heads will ensure that the necessary testing equipment and shoring or shielding is budgeted for, acquired, and maintained as required by the level of excavation activity within their areas of responsibility.

6.3.2 Supervisors

Supervisors will ensure that a “competent” person is in charge of each trench or excavation covered by this procedure. Specifically, each Bridge Crew, Maintenance Crew, Equipment Unit Crew, and Resident Engineer operation that involves a trench or excavation covered by this procedure will have at least one competent person on site while work is being done.

SAFETY POLICY & PROCEDURE

6.3.3 Competent Persons

Each site covered in this procedure will have a competent person who will evaluate conditions and remain at the site as long as employees are working in the trench or excavation. (Reference Appendices B and C.)

Competent persons will be thoroughly familiar with this procedure.

The competent person will evaluate the work site prior to excavation and determine what utilities will be affected. Utility companies will be notified at least 48 hours prior to starting work unless emergency conditions exist (1-800-632-4949).

The competent person will choose either sloping or shielding/shoring as the protective system. A slope of 1-1/2:1 or flatter will be used if sloping is the protective system used. (Reference Appendices D and E.)

The competent person will inspect and document the condition of the trench or excavation and protective system prior to each workshift, throughout each work shift, and after a rainstorm or other hazard increasing event.

If a hazard is detected, the competent person will not permit employees to enter or will immediately remove employees from the trench or excavation until proper protective measures have been taken.

The competent person will ensure that mobile equipment working near the edge of a trench or excavation has a positive warning system such as stop logs or hand signals.

The competent person will ensure that testing with a multigas meter is conducted whenever the possibility of atmospheric hazards in the trench or excavation exists.

The competent person will ensure that information on the site evaluation and protective system selected is available on-site.

6.3.4 Employees

Employees are responsible for reporting suspected unsafe conditions or equipment to the competent person.

Employees must immediately evacuate any trench or excavation when they suspect a collapse is imminent or when directed to do so by the competent person.

SAFETY POLICY & PROCEDURE

6.3.5 Safety and Loss Control

Safety and Loss Control will conduct competent person training and coordinate related training.

Safety and Loss Control will audit protective systems and atmospheric monitoring equipment.

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, competent persons, the Central Equipment Unit, or others on any matter concerning this procedure.

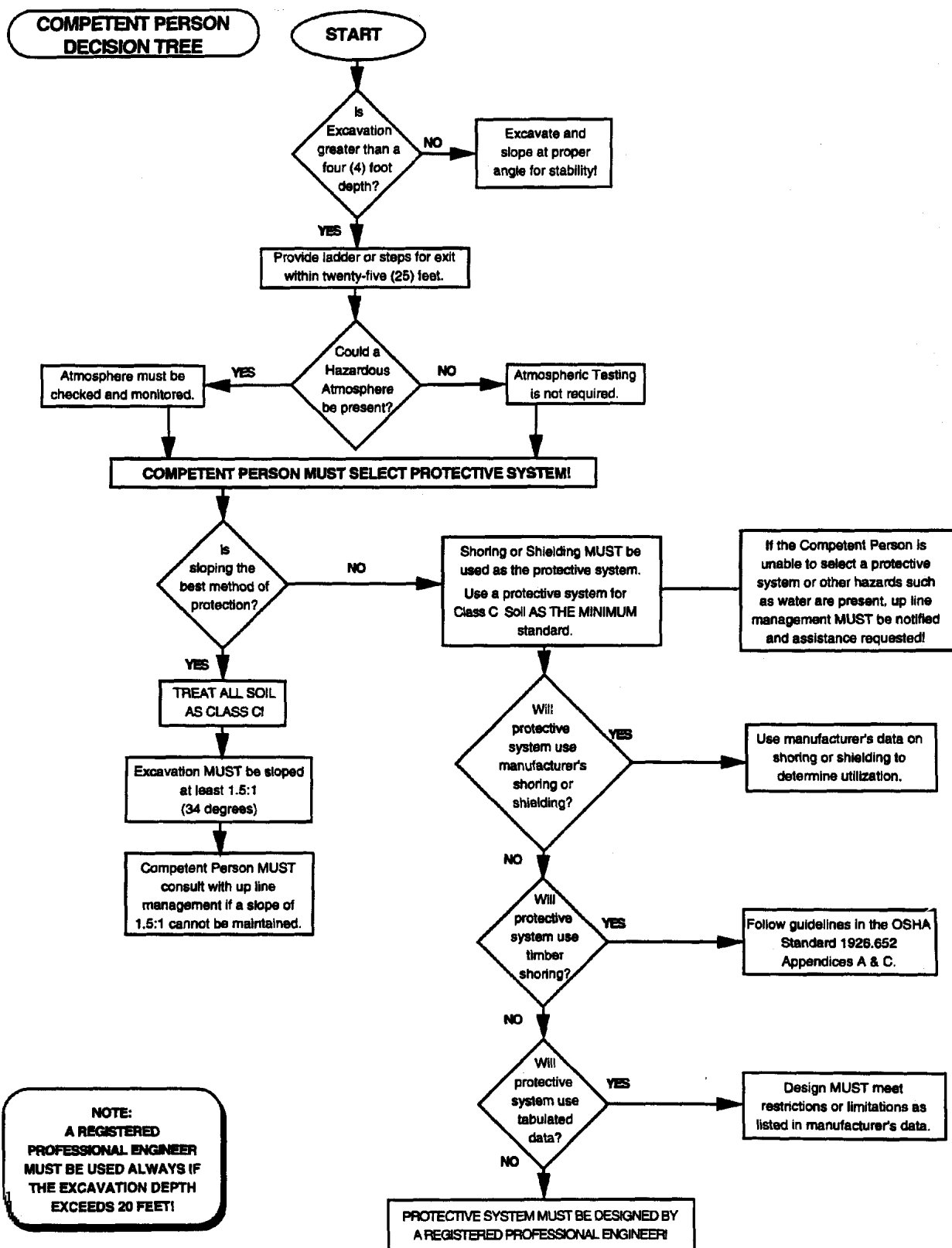
6.3.6 Central Equipment Unit

Central Equipment Unit will ensure that trench shields are available either through inventory or through rental agreements with local suppliers.

Central Equipment Unit will maintain a supply of replacement parts for soil and atmospheric testing equipment.

SAFETY POLICY & PROCEDURE

APPENDIX A: Competent Person Decision Tree



APPENDIX B: Job Reminder Checklist

1. **Pre-Inspect Jobsite**
What is the best protection method? (sloping/shoring/shielding)
How likely are utilities?
What additional equipment is necessary?
Water removal? Air Monitoring? Ladders? Soil testing? Stop logs?
2. **Employee and Equipment Access**
Employee ramp designed by Competent Person
Equipment ramp designed by person qualified in structural design
Exit means located within 25' of employees
3. **Determine Soil Conditions**
All soil is to be classified as type "C" and proper employee protection used based on "C"
Record results on testing record (Appendix C)
Inspect excavation for changing soil conditions
4. **Protection Systems**
Appropriate protection system selected
Installed according to manual or tabulated data
Inspect equipment at start of shift
Remove employee working outside protected area
5. **Monitor Environmental Conditions**
Remove employees from trench where water is accumulating
Monitor use of water removal equipment
Monitor air quality levels if hazardous atmosphere is suspected
6. **Required to Consult with Registered Professional Engineer (RPE)**
When:
Trenches are over 20' deep
Specifically designed shoring or bracing is required
Excavation or trench endangers nearby structure
Standard protection measures cannot be used

May Consult with RPE When:

Unusual or changing soil conditions exist or are anticipated
Soil is unusually good and shoring reduction is required
Soil is unusually poor and may require going to more protective system

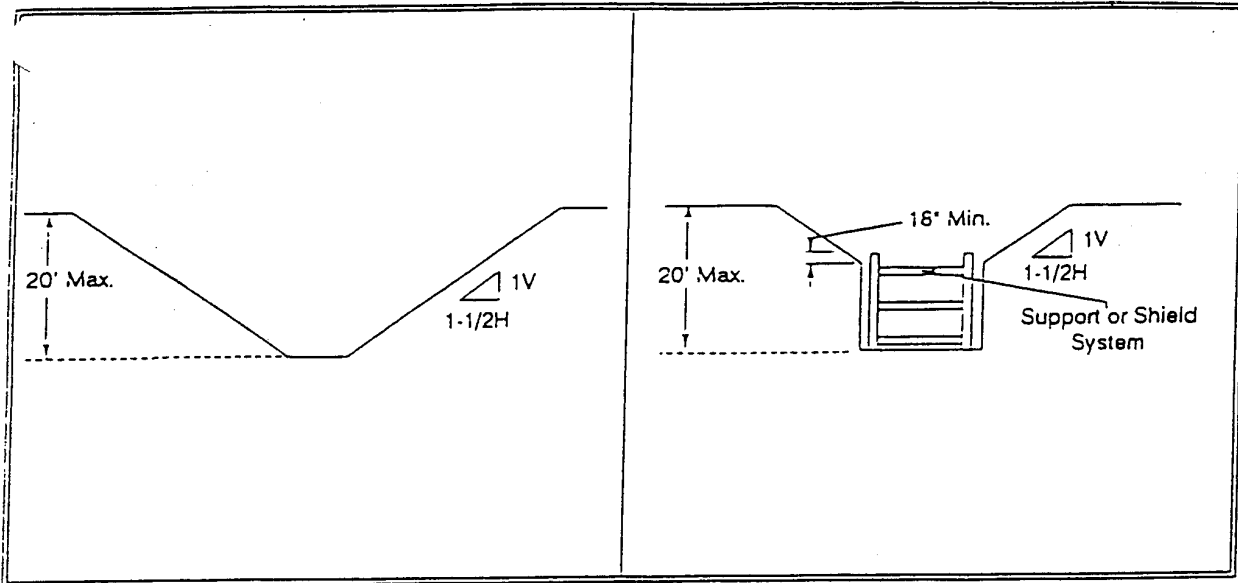
APPENDIX C: Excavation Evaluation

Detailed Evaluation

1. All open trenches have been inspected?
2. All excavated soil was located at least 2 feet away from the edge of the trench?
3. Were any tension cracks observed along top of any slopes?
4. Were slopes cut at the proper angle for stability?
5. Was any water seepage noted in trench walls or trench bottom?
6. Was bracing system installed in accordance with design?
7. Was there evidence of shrinkage cracks in trench walls?
8. Was there any evidence of caving or sloughing of soil since the last field inspection?
9. Were there any zones of unusually weak soils or materials not anticipated?
10. Was there any evidence of significant fracture planes in soil or rock?
11. Were there any noted dramatic dips in bedrock?
12. All short-term trench(s) covered within 24 hours?
13. Trench box(s) certified?
Shield Capacity in pounds per square foot?
14. Were hydraulic shores pumped to design pressure?
15. Type shoring being used _____ secure?
16. Did shoring plan include adequate safety factor to allow for equipment actually being used?
17. Traffic in area adequately away from trenching operations with barricades?
18. Trees, boulders, or other hazards in area?
19. Vibrations from equipment or traffic too close to trenching operation?

SAFETY POLICY & PROCEDURE

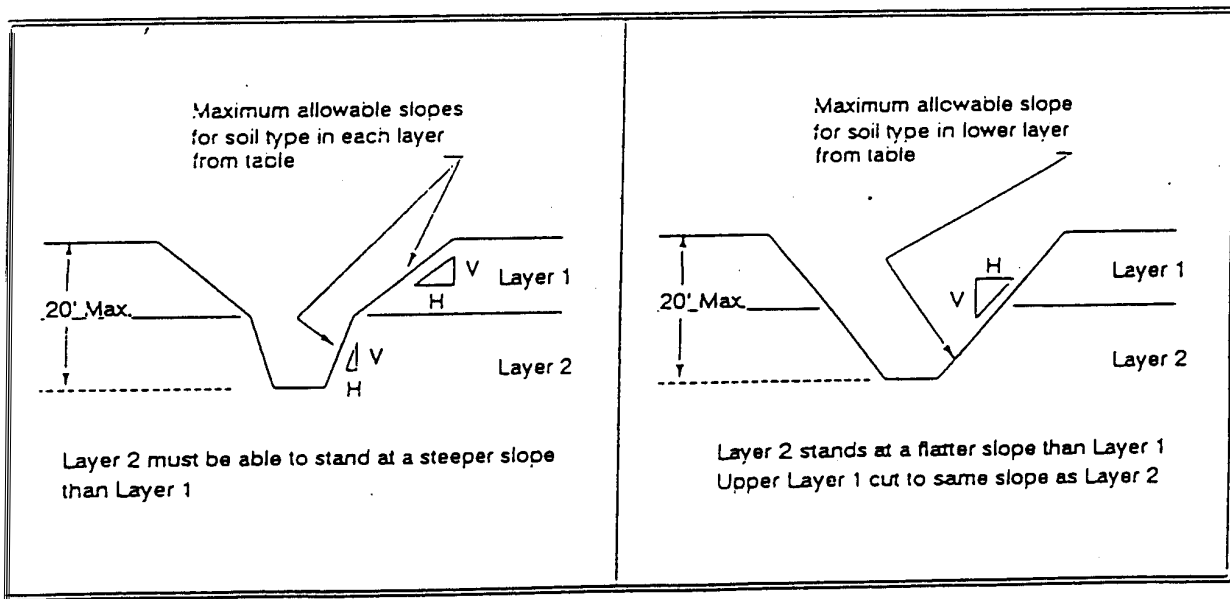
APPENDIX D: Slope Configurations; OSHA Type "C" Soil



Simple Slope

Slope with Supported or Shielded
Vertical Sided Lower Portion

SLOPE CONFIGURATIONS - ALL SOIL TYPES IN LAYERED SOIL



Compound Slope
Weaker layer over stronger layer

Simple Slope
Weaker layer under stronger layer

APPENDIX E: Shoring Tables

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE C P_a = 80' X II + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS**												
	CROSS BRACES							UPRIGHTS					
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET) (See Note 2)			
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE			
5 TO 10	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	8X10	5				
	UP TO 8	8X8	8X8	8X8	8X8	8X10	5	10X12	5				
	UP TO 10	8X10	8X10	8X10	8X10	10X10	5	12X12	5				
10 TO 15	See Note 1												
	UP TO 6	8X8	8X8	8X8	8X8	8X10	5	10X12	5				
	UP TO 8	8X10	8X10	8X10	8X10	10X10	5	12X12	5				
15 TO 20	See Note 1												
	See Note 1												
	UP TO 6	8X10	8X10	8X10	8X10	10X10	5	12X12	5			3X6	
OVER 20	See Note 1												
	See Note 1												
	See Note 1												
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* Mixed Oak or equivalent with a bending strength not less than 850 psf.

** Manufactured members of equivalent strength may be substituted for wood.

APPENDIX E: Shoring Tables (Continued) 2

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE C $P_a = 80 \times H + 72$ psf (2 ft. Surcharge)

SIZE (S4S) AND SPACING OF MEMBERS **														
DEPTH OF TRENCH (FEET)	CROSS BRACES								HALFS			UPRIGHTS		
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE				
5 TO 10	UP TO 6	6X6	6X6	6X6	6X6	8X8	5	8X8	5					
	UP TO 8	6X6	6X6	6X6	8X8	8X8	5	10X10	5					
	UP TO 10	6X6	6X6	8X8	8X8	8X8	5	10X12	5					
10 TO 15	See Note 1													
	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	10X10	5					
	UP TO 8	8X8	8X8	8X8	8X8	8X8	5	12X12	5					
15 TO 20	See Note 1													
	See Note 1													
	UP TO 6	8X8	8X8	8X8	8X10	8X10	5	10X12	5					
20 OVER 20	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

BILLING CODE 4810-28-C

Appendix E: Shoring Tables (Continued) 3

ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE C

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS	
	VERTICAL SPACING (FEET)	SECTION MODULUS (IN ³)	WIDTH OF TRENCH (FEET)						MAX. HORIZ. SPACING (ON CENTER)	
			UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO 15		SOLID SHEET	2 FT. 3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER		
OVER 5 UP TO 10		3.5	6.0	2 IN	6.0	2 IN NOTE(2)	6.0	3 IN	3x12	—
		7.0	6.5	2 IN	6.5	2 IN NOTE(2)	6.5	3 IN		
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN		
OVER 10 UP TO 15	4	3.5	4.0	2 IN	4.0	2 IN NOTE(2)	4.0	3 IN	3x12	—
		7.0	5.5	3 IN	5.5	3 IN	5.5	3 IN		
		14.0	8.0	3 IN	8.0	3 IN	8.0	3 IN		
OVER 15 UP TO 20	4	3.5	3.5	2 IN	3.5	2 IN NOTE(2)	3.5	3 IN	3x12	—
		7.0	5.0	3 IN	5.0	3 IN	5.0	3 IN		
		14.0	6.0	3 IN	6.0	3 IN	6.0	3 IN		
OVER 20	NOTE (1)									

APPENDIX F: Competent Person Guide to an OSHA Inspection

As a Competent Person for a NCDOT excavation, you should be prepared to discuss the trench configuration and associated information with an OSHA Inspector should one visit your operation. The following information is provided as guidance. Feel free to refer to this document and any other documentation during your conversation with the Inspector.

1. The OSHA Inspector must show his credentials.
2. You will be asked about your length of experience in this occupation.
3. You will be asked about your training as a competent person.

Be prepared to identify when your last Competent Person training was conducted.

4. You will be asked about your expertise in soils analysis.

You should inform the OSHA Inspector of NCDOT's position that all soils are treated as Class C soils unless determined by supervision trained in soils classification. Use Appendix A of this procedure to demonstrate the decision process used in determining how to make the excavation a safe working environment.

5. You may be questioned about the protective systems especially if you are working with a trench box or are utilizing shoring at the work site.

Explain the configuration and how the type protection was chosen.

6. You may be asked specific questions regarding 29CFR 1926.650, the OSHA standard on Excavation, Trenching and Shoring.

Utilize this procedure as your reference for any questions which might arise.

7. You will be asked if you as the Competent Person have the authority to take immediate corrective measures to eliminate existing and predictable hazard as well as the authority to stop work.

As the Competent Person, you have this authority and should so state.

8. You will be asked about inspections of the excavation you have performed.

It is recommended that you maintain a log of all inspections performed as well as of any actions you have taken to reduce hazards. Inspections should be not only of the excavation but also of the adjacent areas and protective systems if they are being used for the specific job. Utilize Appendices B and C for these inspections.

APPENDIX F: Competent Person Guide to an OSHA Inspection (Continued) 2

9. If water is present, you will be asked about it.

Explain what precautions have been taken to preclude water from creating a hazard. This may consist of de-watering equipment, repetitive inspection of de-watering operations or, where de-watering equipment is not used, constant monitoring of water/soil conditions.

10. If a structural ramp is in place for employees, you will be asked about it.

Explain its function, who designed and installed it, and how it was determined where it would be located.

11. If an equipment ramp is in place, you will be asked if it was designed by a person qualified in structural design.

Explain who designed the ramp and their qualifications.

12. You may be asked about air monitoring for oxygen deficiency or toxic gases.

If you are using air monitoring equipment, explain your rationale for doing so. If not, explain why air monitoring is not required.

There are a variety of other questions that may arise during a conversation with an OSHA Inspector. Be sure you understand his questions and answer them truthfully. If asked questions which you cannot answer, try to find the answer for him/her.

Always attempt to notify your supervisor immediately when you are visited by an OSHA Inspector. Make detailed notes about any conditions or potential hazards the Inspector identifies to you. The quality of your notes at this time plays an important part in our being able to address any hazards identified in a timely manner.

Fire Protection**SPP# 1910.157****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish the methods and accountability for fire protection and safety at North Carolina Department of Transportation (NCDOT) facilities.

2.0 Scope and Applicability

Fire protection is important to NCDOT to minimize loss of life and property. The cost of fire protection is small compared to potential costs of incalculable human suffering and lost property.

This safety policy and procedure provides guidelines for implementing fire protection in the workplace. It includes provisions for training, discussion on portable fire extinguisher's classification and use, and information on fire hoses, water sprinkler systems, halon systems, and sprinkler system's alarms.

This document also details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This safety policy and procedure applies to all employees.

SAFETY POLICY & PROCEDURE

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.157).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all NCDOT facilities will have fire protection equipment to minimize the results from fire hazards. When fire hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, and proper training regarding Fire Protection will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's policy on Fire Protection. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor and to become familiar with the use and location of fire-fighting equipment. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's policy on Fire Protection.

6.1 Definitions

Class A Fires

Fires that involve ordinary combustible solids or "surface burning fires." Examples of Class A fires include wood, clothing, plastics, paper, and asphalt.

Class B Fires

Fires that involve gases, greases, and flammable combustible liquids. Examples of Class B Fires include gasoline, kerosene, alcohol, and lubricating oils and greases.

Class C Fires

Fires that involve electrical circuits of electrical equipment or fires near such equipment. Examples of Class C fires include electrical motors, switch boxes, junction boxes, transformers, and energized or live wires.

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Class D Fires

Fires that involve combustible metals which require special fire tactics and extinguishing agents. Class D fires include metals such as magnesium, potassium, powdered aluminum, zinc, sodium, and titanium.

Fixed Extinguishing System

A permanently installed system that either extinguishes or controls a fire within the area.

Halon

A colorless electrically nonconductive gas which is a medium for extinguishing fires by inhibiting the chemical chain reaction of fuel and oxygen.

Hydrostatic Testing

Testing performed on fire extinguisher cylinders to check the integrity of the cylinders.

Incipient Fires

Fires which are in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, standpipe or small hose system without the need for protective clothing or breathing apparatus.

Inspection

A visual check of fire protection systems and equipment to ensure that they are in place, charged, and ready for use in the event of fire.

Sprinkler System

A fire protection system with overhead discharge nozzles installed in a systematic pattern that ejects an extinguishing medium from ceiling to floor level.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. The provisions adopted by NCDOT are:

- Training
- Portable Fire Extinguishers
- Fire Hoses
- Water Extinguishing Sprinkler Systems
- Halon Extinguishing Systems
- Fire Alarms and Alarms for Sprinkler Systems

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6.2.1 Training

Employees will be trained on the general principles of fire protection upon initial employment and annually thereafter. Training will consist of:

- Classification, Ratings, and Performance of Fire Extinguishers
- Classification of Hazards
- Purpose of Hydrostatic Testing of Fire Extinguishers
- How Water Systems Work
- How CO₂ and Halon Extinguishing Systems Operate
- Location of Fire Exits and Escape Routes
- Use of Fire Extinguishers
- Purpose and Typical Operations of Alarm Systems

Additionally, supervisors or designated employees will be trained in:

- Selection and Distribution of Extinguishers
- Inspection, Maintenance, and Recharging of Extinguishers

6.2.2 Portable Fire Extinguishers

NCDOT shall provide portable fire extinguishers that are:

- Consistent with the hazard
- Properly mounted and located
- Inspected, maintained, and tested

Portable fire extinguishers will be selected and distributed based on the classes of anticipated fires, and the size and degree of hazard. Most fires in NCDOT operations will include materials found in Classes A, B, and C. Thus, the most common type of extinguisher NCDOT will provide will be designed to effectively suppress these particular conditions. However, fire extinguishers for Class D fires will be provided when hazards associated with Class D fires exist. Halon fires extinguishers will be provided to extinguish Class C fires involving computers and related equipment. See Figure 1 for the different types of fire extinguishers.

Portable fire extinguishers will be mounted conspicuously, located and identified so they are readily accessible. Extinguisher locations will be carefully selected to ensure extinguishers are adequately spaced and are not in danger of being damaged by vehicles, weather, or storage materials.

Employees will be informed of the location of fire extinguishers. Extinguishers will be visible from a distance of at least 3 feet. Wall markings for fire extinguisher locations will be visible from a distance of at least 25 feet.

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They shall be located along normal paths of travel, including exits from an area. All paths to fire extinguishers must remain clear to provide easy access. For related information, refer to [SPP# 1910.38, Emergency Evacuation and Fire Prevention Plans.](#)

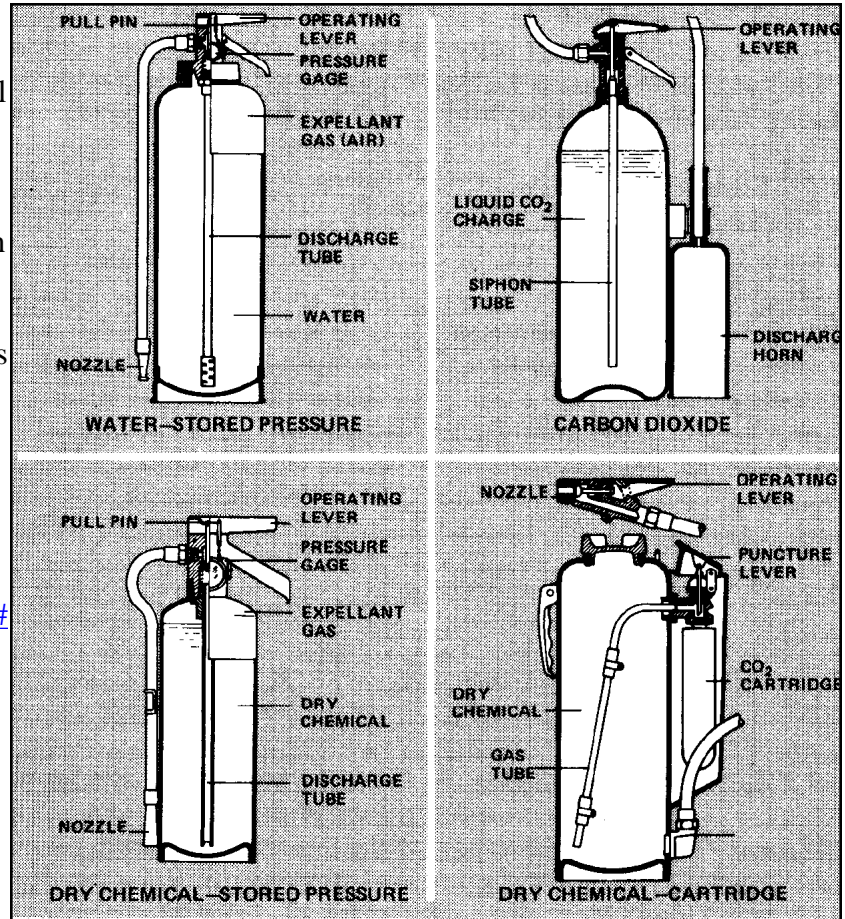


Figure 1

Portable fire extinguishers shall be visually inspected monthly to ensure they are charged and operable. They are to be recharged after use or pressure leakage. Fire extinguishers will be equipped with an inspection tag, and the inspector must initial and date the tag each month to document the inspection. Tags will be replaced when all lines are used or when tags are lost or removed.

Any extinguisher that shows excessive wear, damage or unserviceable condition will be removed from service and replaced by an operable extinguisher.

Fire extinguisher maintenance will be performed at least annually by an approved contractor or trained NCDOT personnel.

During any period when an extinguisher is removed from service for testing, another extinguisher must replace the extinguisher out for testing.

Annual inspection records will be maintained for review by regulatory agencies and for internal audit purposes. Appendix A presents the portable fire extinguisher hydrostatic testing schedule for NCDOT.

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6.2.3 Water Extinguishing Sprinkler Systems

Water extinguishing systems are fixed extinguishing systems used in areas requiring a higher degree of fire protection than is provided by fire extinguishers. These are heat-activated systems with automatic water supplies and overhead ceiling mounted sprinklers. Upon being activated, these water extinguishing systems discharge water over the fire area. Water extinguishing systems will be inspected annually by an approved outside contractor to ensure their operation is sufficient.

6.2.4 Halon Extinguishing Systems

Halon extinguishing systems are also considered fixed extinguishing systems. They are used in areas that contain large quantities of computer or other sensitive equipment susceptible to permanent water damage. Halon systems, designed to deplete oxygen from the area thus extinguishing the fire, will be inspected annually by an approved outside contractor to ensure their operation is sufficient.

6.2.5 Fire Alarms and Alarms for Sprinkler Systems

Facilities in areas where municipal fire departments are available may have an alarm box located in the building. Other facilities, which may contain several buildings, may have auxiliary alarm boxes connected to the municipal fire alarm system at various points in the facility.

Water sprinkler and halon systems will be equipped with an audible alarm designed to alert employees that the systems have been activated.

Water sprinkler system alarms can be activated either by the heat detection system or by the flow of water through the sprinkler. Therefore, the alarm will sound approximately the same time water is discharged from the sprinklers.

Halon systems will have a pre-discharge alarm capable of being perceived above noise levels. This audible alarm will sound in time for all employees to safely exit the discharge area prior to the system discharge. Additionally, this audible alarm should continue after the halon discharge until positive action has been taken to acknowledge the alarm.

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6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for budgeting and ensuring that adequate funds are available for the purchase of portable fire extinguishers for their respective work places. For newer NCDOT facilities with water and/or halon sprinkler systems, managers/unit heads will ensure service contracts are in place for the annual servicing of these systems and the audible alarms associated with them.

They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also audit their fire protection program for compliance with this safety policy and procedure. Managers/Unit Heads should refer to [SPP # 1910.38, Emergency Evacuation and Fire Prevention Plans](#), for related information on fire prevention.

6.3.2 Supervisors

Supervisors will ensure that employees are trained in the general principles of fire protection and the use and function of various fire protection equipment. Additionally, they shall ensure that there are an adequate number of portable fire extinguishers for each work area. Supervisors should refer to [SPP #1910.38, Emergency Evacuation and Fire Prevention Plans](#), for related information on fire prevention.

Supervisors will ensure that fire extinguishers are recharged after each use. They will also ensure that damaged or defective fire extinguishers are removed from service and replaced. Supervisors will also ensure that monthly and annual testing and maintenance is performed on the portable fire extinguishers. Records of inspections and testing shall be maintained and retained by the supervisor.

Supervisors may have designated employee trained to assume some of their responsibilities for fire extinguisher selection, distribution, inspection, maintenance, and testing.

6.3.3 Employees

Employees are responsible for reporting fire hazards to their supervisors. **Actual fires will be reported immediately to the local fire department before any attempts are made to extinguish the fire. Employees will not attempt to extinguish fires beyond the incipient stage.**

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6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased fire extinguishers comply with fire protection standards and this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure. Safety and Loss Control Safety Engineers will assist managers/unit heads and supervisors with the selection of proper types and locations for fire extinguisher placement for new buildings and renovations.

6.3.5 Central Equipment Unit

Central Equipment Unit will maintain a supply of replacement portable fire extinguishers including those rated for types A, B, and C hazards. Class D extinguishers will be made available only after consultation with Safety and Loss Control.

SAFETY POLICY & PROCEDURE

APPENDIX A: Portable Fire Extinguisher Hydrostatic Testing Schedule

Types of extinguishers	Test interval (years)
Soda acid (stainless steel shell)	5
Cartridge operated water and/or antifreeze	5
Stored pressure water and/or antifreeze	5
Wetting agent	5
Foam (stainless steel shell)	5
Aqueous Film Forming Foam (AFFF)	5
Loaded stream	5
Dry chemical with stainless steel	5
Carbon Dioxide	5
Dry chemical, stored pressure, with mild steel, brazed brass or aluminum shells	12
Dry chemical, cartridge or cylinder operated; with mild steel shells	12
Halon 1211	12
Halon 1301	12
Dry powder, cartridge or cylinder operated with mild steel shells	12

Accident Prevention Signs and Tags SPP# 1910.145

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1.0 Purpose

The purpose of this safety policy and procedure is to establish a method for marking physical hazards.

2.0 Scope and Applicability

Color coding is a standard way of quickly transmitting information. North Carolina Department of Transportation (NCDOT) has adopted color codes based on OSHA and ANSI standards to convey safety information.

This safety policy and procedure provides a listing of color codes adopted by NCDOT and guidelines for accident prevention signs and tags specifications. It includes provisions for training and discussion on the design and messages contained on these accident prevention signs and tags.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects all NCDOT employees.

S SAFETY POLICY & PROCEDURE

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.145) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.200).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death and serious physical harm to employees or the public. Therefore, accident prevention signs and tags will be used to establish uniformity and promote a safe working environment throughout NCDOT. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, and proper training regarding Accident Prevention Signs and Tags will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Accident Prevention Signs and Tags. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Accident Prevention Signs and Tags.

6.1 Definitions

Major Message

The portion of a sign or tag that indicates the specific hazardous condition or instructions for the exposed person.

Sign

A surface prepared for warning or providing safety instructions for workers and the public that may be exposed to hazards. This category does not include highway signs or safety posters used for employee education.

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Signal Word

The word(s) printed on a sign or tag intended to capture a person's immediate attention.

Tag

A device made of paper, pasteboard, plastic or other material used to identify a hazardous condition.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Color Codes
- Accident Prevention Signs
- Accident Prevention Tags

6.2.1 Training

Employees will be trained to recognize and understand the warning information conveyed on accident prevention signs and tags. Training will include:

- The purpose of color codes
- The purpose of accident prevention signs and tags
- The types of accident prevention signs and tags
- The use of accident prevention signs and tags
- The meanings of messages on accident prevention signs and tags
- The special precautions made necessary by messages on accident prevention signs and tags

6.2.2 Color Codes

The following color codes are adopted by NCDOT:

- **Red** is recommended for identifying fire protection equipment, danger, and emergency stops on machines.
- **Yellow** because of its high visibility is the standard color for marking hazards that may result in accidents from slipping, falling, striking against, etc.
- **Green** in combination with white, such as the green cross on a white background, designates the location of first aid and safety equipment.

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- **Black and White** and combinations of the two in stripes or checks are used for housekeeping and traffic markings.
- **Orange** is the standard color to highlight hazardous parts of machines or electrical equipment, such as exposed edges of cutting devices, the inside of removed guards, and the doors and covers of switch boxes. Orange is also used for biological and similar types of hazards.
- **Reddish-Purple (magenta)** identifies radiation hazards, such as radioactive materials in rooms and containers.

6.2.3 Accident Prevention Signs

Accident prevention signs are not considered the final step to be taken against hazards. Whenever possible, the hazards are to be eliminated.

The designs of accident prevention signs will be uniform throughout NCDOT. These signs must be visible at all times when work is being performed. The messages on these signs will be removed or covered when the hazard no longer exists.

Each accident prevention sign will include a major message that indicates the risk level of the hazard present. The following accident prevention signs are recommended for NCDOT use:

- **Danger signs** will be red, black and white. They will be used when an immediate hazard exists or when special precautions are necessary. These signs will be conspicuously posted.
- **Caution signs** will have a black upper panel and yellow letters. The lower panel will have a yellow background and black letters. These signs will be used to warn of possible hazards or against unsafe practices.
- **Safety instruction signs** will be white with a green upper panel and white letters. Any additional wording on the sign will be black letters on a white background. These signs will be used where general instructions or guidelines for safety are required such as *Fasten Seat Belts, Look Before Backing*, etc.
- **Slow moving vehicle emblems** will be a yellow-orange triangle with a dark red reflective border. These signs will be used on any vehicle or equipment traveling at a speed of 25 miles per hour or less.
- **Biological hazard signs** will be florescent orange-red with lettering or symbols in a contrasting color. These signs will be used to inform

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employees of the actual or possible presence of biological hazards.

- **Radiation hazard signs** will contain the conventional radiation caution colors (magenta or purple on yellow background) and the standard radiation symbol.
- **Directional signs**, other than automotive traffic signs, must be white with a black panel and white directional symbol. Any additional wording on the sign shall be black letters on the white background.
- **Exit signs**, when required, must be lettered in legible red letters not less than 6 inches high on a white field and the principal stroke of the letters must be at least three-fourths of an inch wide.
- **Traffic signs** shall be posted in construction areas with legible traffic signs at points of hazard. All traffic control signs or devices used for protection of State employees and the public shall conform to the latest version of the manual on Uniform Traffic Control Devices.

For asbestos areas, caution labels are to be affixed to all raw materials containing asbestos.

The label shall state:

CAUTION:

Contains Asbestos Fibers
Breathing Asbestos Dust May Cause
Serious Bodily Harm

Appendix A presents examples of accident prevention signs.

6.2.4 Accident Prevention Tags

Accident prevention tags are a temporary method of warning of a hazardous condition, defective equipment, radiation hazards, etc. However, accident prevention tags will not be used as a substitute for accident prevention signs. The designs of accident prevention tags will be the same as accident prevention signs. The messages on these tags will be removed or covered when the hazard no longer exists.

Accident prevention tags will contain a signal word or emblem (such as *Danger*, *Caution*, or *Biohazard*) and a major message. The signal word will be readable from a distance of at least five feet and will be understandable to all employees. The major message will indicate the particular hazard involved or instructions to the exposed person. Accident prevention tags will be located and secured as close as possible to the hazard.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of accident prevention signs and tags in their areas.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure compliance with accident prevention sign and tag specifications through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that an adequate supply and variety of accident prevention signs and tags are maintained in their inventory.

Supervisors will ensure that areas needing accident prevention signs and tags are so marked.

6.3.3 Employees

Employees shall comply with the warnings and instructions given on accident prevention signs and tags. Employees will immediately notify their supervisors about those work areas requiring accident prevention signs and tags.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning accident prevention signs and tags. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased accident prevention signs and tags comply with this safety policy and procedure.

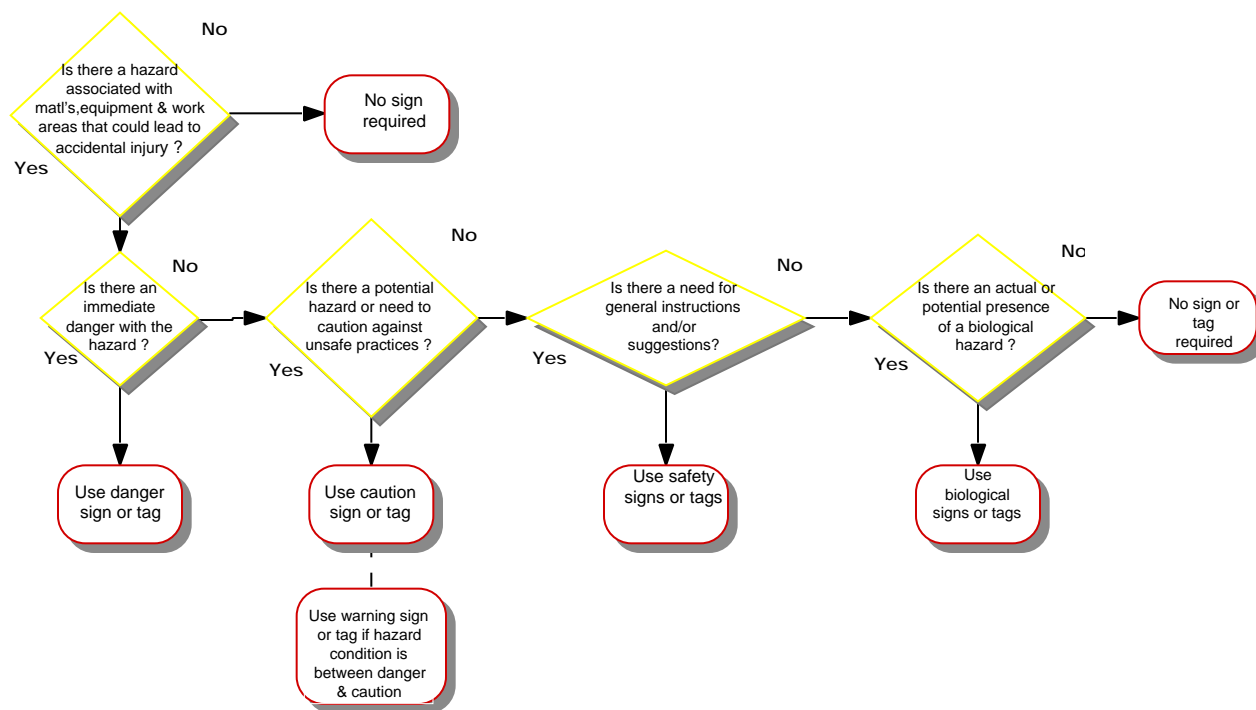
Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will maintain an adequate stock of accident prevention signs and tags.

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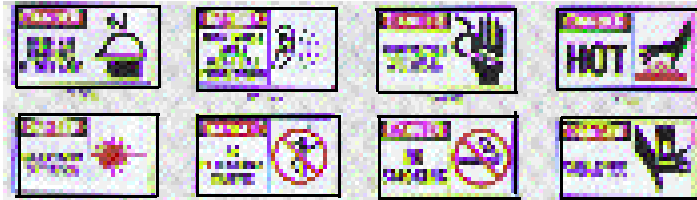
Accident Prevention Signs/Tags Flow Chart (Workplace Application)



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APPENDIX A: Sign Examples

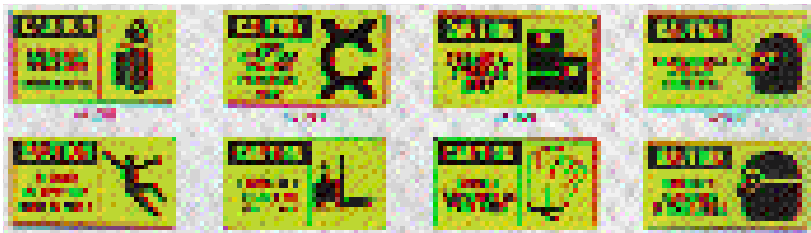
Danger Sign Examples



Slow Moving Vehicle Emblem



Caution Signs Examples



Safe Instructional Signs Examples



Biological Hazard Signs



Radiation Hazard Signs



Confined Space Entry

SPP# 1910.146

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1.0 Purpose

The purpose of this safety policy and procedure is to protect North Carolina Department of Transportation (NCDOT) employees who enter confined spaces.

2.0 Scope and Applicability

A confined area or space is one which by design has limited openings for entry and exit, which has unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces are located throughout NCDOT with different types of

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hazards associated with them. Confined spaces can present dangerous hazards to NCDOT employees who perform work activities in them.

This safety policy and procedure provides guidelines for entry into confined spaces to protect NCDOT employees who work in them. It includes provisions for training and discussion on what defines a confined space. This safety policy and procedure presents details on the hazards of confined spaces and on identifying confined spaces. Additionally, it presents discussion on evaluating confined spaces and the requirements for permit-required confined space entry. This document also provides recordkeeping requirements.

This safety policy and procedure details the areas of responsibility for managers/unit heads, supervisors, employees, entrants, attendants, entry supervisors, qualified persons, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This document applies to any operation that requires NCDOT employees or contractors to enter or work inside any existing tank, tank car, tower, sewer, manhole, sump, vault, vat, process vessel, pit, tunnel, or similar confined spaces. This safety policy and procedure applies to but is not limited to the following NCDOT employees and operations:

- Employees who enter weigh station pits
- Employees who enter trenches
- Ferry Maintenance employees who enter areas below the weather deck excluding the engineering room below deck
- Maintenance and Bridge employees who work in pipes and culverts
- Inspectors and Maintenance employees who work in specified bridge beam areas
- Employees who work on sewage and water treatment facilities located at rest stops or welcome centers
- Maintenance employees who work in catch basin areas
- Maintenance employees who enter weigh scale pits for operational service
- Traffic Service employees who enter paint tanks
- Any employee who enters boilers
- Employees who use and/or maintain grease pits at equipment shops
- Bridge employees who enter caissons

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.146) and Occupational Safety and Health Standards for the Maritime Industry (29 CFR 1915.11-16).

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4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, at each NCDOT facility and/or jobsite, confined spaces will be identified and, as applicable, permitted and posted with warning signs. When confined space hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Confined Space Entry will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Confined Space Entry. It is also the responsibility of each NCDOT employee to report immediately unsafe conditions to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's safety policy and procedure on Confined Space Entry.

6.1 Definitions

Attendant

Person who remains outside the permitted space while the work is being done.

Confined Space

A confined space by design has limited openings for entry and exit, may lack adequate ventilation, and may contain or produce dangerous air contamination.

Entrant

A employee who is authorized by the employer to enter a permitted space.

Entry Permit

A written document that is provided by the employer to allow and control entry into a permit required space.

Entry Supervisor

The person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required.

Hot Work Permits

A permit allowing employees to perform work involving welding, cutting, or any task that would deplete oxygen, create toxic fumes and vapors, or create the potential for fire or explosion.

Lower Explosive Limit (LEL)

The minimum concentration of a combustible/flammable gas or vapor in air which will ignite if an ignition source is present.

Oxygen Deficiency

An atmosphere containing oxygen at a concentration of less than 19.5% by volume as measured by an oxygen measuring device.

Oxygen Maximum

An atmosphere containing oxygen at a concentration of more than 23.5% by volume as measured by an oxygen measuring device.

Qualified Person

A person who has been trained and authorized to perform atmospheric testing.

Upper Explosive Limit (UEL)

The maximum concentration of a combustible/flammable gas or vapor in air before its saturation point which will ignite if an ignition source is present.

6.2 General Provisions

This section details the general provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Confined Spaces
- Hazards of Confined Spaces
- Identifying Confined Spaces
- Evaluating Confined Spaces
- Permit-Required Confined Space Entry Requirements
- Recordkeeping

6.2.1 Training

The formal written confined space training program is to provide employees with the necessary understanding, skills, and knowledge to safely perform their jobs. The components of this formal written training program includes instruction on:

- Types of confined spaces
- Confined space hazards
- Atmospheric testing of confined spaces
- Cleaning and ventilation

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- Lockout of confined spaces
- Personal Protective Equipment (PPE)
- Respirator use and care
- Buddy systems and emergency procedures
- Communication procedures
- Emergency rescue and procedures
- Hot work

Initial and refresher training are to be provided to employees. Refresher training must be conducted whenever an employee's duties change, whenever hazards in the confined space change, or whenever an evaluation of the confined space entry program identifies inadequacies in the employee's knowledge.

Employees designated to enter confined space work areas will be trained in the following areas (this includes entrant, attendant, and rescue team):

- Emergency entry and exit procedures
- Applicable respirators
- First Aid and CPR
- Lockout barriers at worksites
- Safety equipment use
- Rescue equipment
- Permit system
- Work practices

Appendix A presents a training certification form to document the affected employees' training on confined spaces.

Qualified persons shall be trained in:

- Atmospheric testing methods
- Meter calibration
- Atmospheric behaviors of oxygen, combustible, and toxic gases

Qualified persons shall receive initial and refresher training.

6.2.2 Confined Spaces

In NCDOT, a confined space is one that:

- Is large enough for a person to enter and perform assigned work
- Has entry and exit openings that may be limited in size and/or number
- Is not intended for continuous human occupancy

Confined spaces in NCDOT can include any existing tank, tank car, tower, sewer, manhole, sump, vault, vat, grease pit, tunnel, or other similar confined spaces as shown in Figure 1.

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6.2.3 Hazards of Confined Spaces

Confined spaces present many hazards to employees due to the nature of the space's shape, size, lack of ventilation, proximity to toxic gases, and other contributing substances. Potential confined space hazards include hazardous atmospheres, and general safety hazards.

Hazardous atmospheres expose employees to risks of death, incapacitation, injury, or acute illness. These hazardous atmospheres include:

- A flammable gas, vapor, or mist in excess of ten percent of its lower flammable limit (LFL)
- An airborne combustible dust at a concentration that obscures vision at a distance of five feet or less
- An atmospheric oxygen concentration below 19.5 percent or above 23.5 percent
- An atmospheric concentration of any substance for which a permissible exposure limit is published in Subpart Z of 29 CFR Part 1910 and could result in employee exposure in excess of its permissible limit(s)
- Any atmospheric condition recognized as immediately dangerous to life or health

General safety hazards include but are not limited to:

- Physical hazards
- Structural hazards
- Electrical hazards
- Mechanical hazards
- Biological hazards
- Radiation hazards

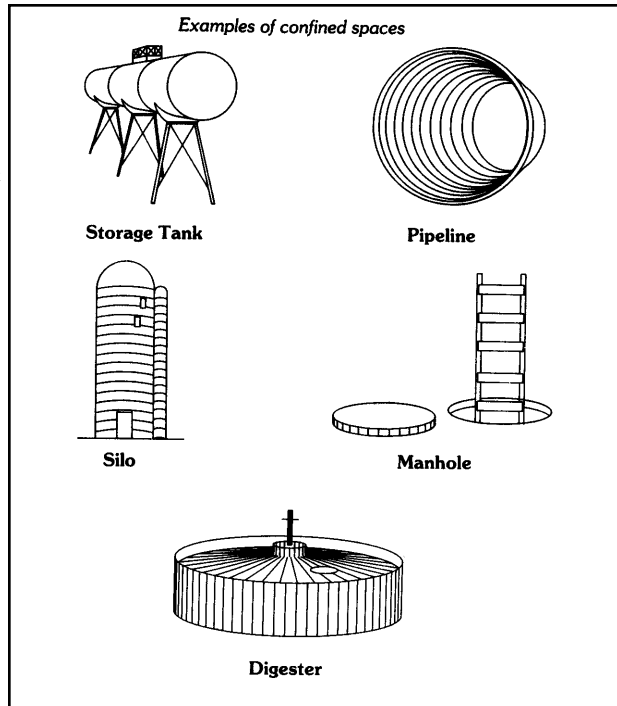


Figure 1

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Physical hazards include non-chemical, physiologic stressors and include noise, vibration, slick/wet surfaces, falling objects, temperature extremes, employee fatigue, and engulfment.

Structural hazards include confined space areas that may contain structural defects.

Electrical hazards include shock, burns, and/or electrocution due to exposed or ungrounded electrical energy sources.

Mechanical hazards include any inadvertent mechanical movement of or within a confined space that threatens the safety of the employee working in the confined space.

Biological hazards include bacterial action that can consume oxygen to produce carbon monoxide or emit hydrogen sulfide or methane.

Radiation hazards include those sources that can inadvertently expose employees to dangerous levels of radiation.

6.2.4 Identifying Confined Spaces at Your Facility

All confined spaces at your worksite/facility must be identified and located so the permit-required confined space permit program can be established. Visually survey your worksite/facility to identify confined spaces that are present and that will be included in the confined space inventory. List all suspected confined spaces.

If a work space meets the confined space criteria, note it for inclusion into your worksite/facility's confined space inventory. Appendix B provides a convenient format for inventorying your confined spaces.

6.2.5 Evaluating Confined Spaces

Once all the confined spaces have been identified, then those confined spaces must be evaluated to determine the hazards that may be present. Hazardous atmospheres and general safety hazards must be evaluated for all the confined spaces.

A hazardous atmospheric evaluation must be performed by conducting atmospheric testing to assess the conditions in the confined space. Appendix C presents atmospheric testing procedures that should be followed by a qualified person. Results of the atmospheric testing should be documented for later use.

General safety hazards should be assessed by physical observation. This physical observation should include a visual assessment of:

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- The engulfment potential
- The internal configuration of the confined space
- Other serious safety or health hazards

Additionally, assessment should be based on knowing the existing conditions and use of the confined space along with the actual and potential hazards posed by materials and substances in the confined space. Appendix D presents a Confined Space Evaluation Form.

If any of these hazards are present, then the confined space is a permit-required confined space. If none of these hazards is present, then it is not a permit-required confined space.

If a change in use or configuration of a non-permit-required confined space increases hazards to entrant, then the space must be reevaluated for possible reclassification to a permit-required confined space.

A permit-required confined space may be reclassified to a non-permit-required confined space if:

- The permit-required confined space poses no atmospheric hazards and all non-atmospheric hazards are eliminated without entry
- Entry is necessary to eliminate hazards and such entry is performed in accordance with the confined space entry program, and testing and inspection during entry indicate that hazards have been eliminated
- The basis for determining that all hazards are eliminated is documented and certified

Reclassification is effective as long as the hazards remain eliminated.

6.2.6 Permit-Required Confined Space Entry Requirements

Once all permit-required confined spaces have been identified, no employee can enter that space until several requirements are met. These requirements include:

- Establishing a permit system
- Conducting pre-entry atmospheric testing
- Isolating energy sources (lockout/tagout)
- Ventilating and cleaning the confined space
- Posting permit-required confined spaces with warning signs
- Having appropriate PPE
- Having appropriate tools in place
- Having attendants in place
- Having rescue teams in place
- Having provisions for contractor compliance with these requirements

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The permit system for each worksite/facility shall include a listing of all permit-required confined spaces, a warning sign/label at each permit-required confined space, and permit issuance by a qualified supervisor or safety professional.

Once all permit-required confined spaces are identified, they will be marked with a sign (examples shown in Figure 2) advising personnel and the general public as to the dangers involved. Where practical, all permit-required confined spaces will be locked or blocked to prevent entry.

A qualified supervisor must authorize entry, prepare and sign written permits, order corrective measures if necessary, and cancel permits when work is completed. The entry permit is completed and posted in a conspicuous location near the entrance. Permits must be available to all permit space entrants at the time of entry and should extend only for the duration of the task. They must be retained for a year to facilitate review of the confined space program.



Figure 2

Appendix E presents a Confined Space Entry Permit. This permit must be completed prior to a permit-required confined space entrance. Appendix F presents a Confined Space Entry Program Element Contact List. These forms shall be maintained at each facility or operation by the individual charged with administering the Confined Space Permit Program.

If welding is to be performed in the confined space (permit-required or non permit-required), a hot work permit must also be obtained. See [Welding, SPP # 1910.252](#) for additional information.

Pre-entry atmospheric testing for the confined space shall be performed prior to employee entrance. See Appendix C for atmospheric testing procedures.

Energy sources will be completely isolated by physical disconnection, double blocking, bleeding, or by lockout/tagout procedures. Figure 3 presents some typical lock/tagout devices. Also, see [SPP# 1910.147, Lockout/Tagout](#), for additional details.

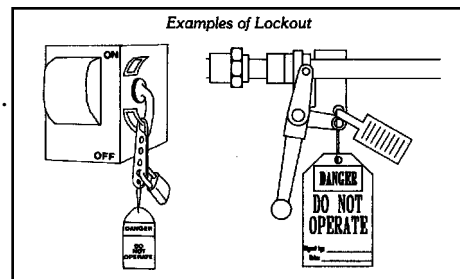


Figure 3

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Ventilation and cleaning shall be performed to empty, flush, or purge spaces from the outside if feasible. Figure 4 presents a typical ventilation configuration to empty, flush, or purge a confined space.

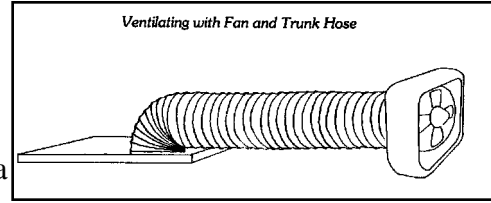


Figure 4

During pre-entry ventilation, the blowing duct outlet should be positioned for uniform dilution and elimination of any hazardous atmospheres pockets as shown in Figure 5.

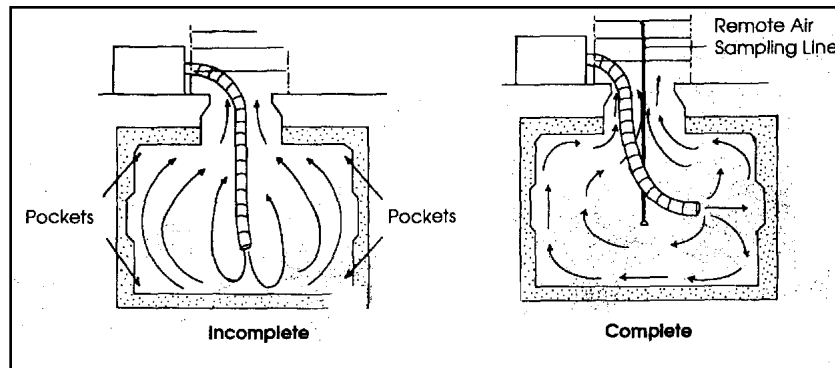


Figure 5

When a hazardous atmosphere is detected, ventilation will continue until:

- The job is completed
- The space has no harmful concentration of toxic gases or vapors and acceptable oxygen concentrations

The atmosphere will be tested 3 times until safe levels are maintained.

The **appropriate PPE** should be worn based on the hazard(s) and include:

- Eye and face protection
- Head protection
- Foot and leg protection
- Body protection
- Hearing protection
- Respiratory protection
- Hand and arm protection
- Harness, safety belts, and lifelines

See [SPP# 1910.331, Personal Protective Equipment](#), for details on matching PPE to the hazard.

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Appropriate equipment and tools must be in place and in good condition. See [SPP# 1910.241, Hand and Portable Power Tools](#), for additional details.

The **attendant** shall be stationed immediately outside permit-required confined spaces and shall:

- Be trained in rescue
- Not enter the permit-required confined space
- Be within sight or call of the entrant
- Have means to summon assistance
- Have safety and rescue equipment on hand

The attendant shall be physically capable of assisting any employee inside the confined space in the event of an emergency. This individual will be responsible for alerting others that a rescue is in progress and for taking appropriate measures to ensure the safety of all co-workers in the area. ***No employee is to enter a confined space if another employee goes down!*** The attendant shall always seek assistance.

Appropriate communications should be established such as radios or walkie-talkies if the employee gets out of sight or earshot.

Rescue teams must be available for permit-required confined spaces. Rescue equipment and self-contained breathing apparatus must be available.

Contractors who perform permit-required confined space entry must comply with all the OSHA requirements.

6.2.7 Recordkeeping

Recordkeeping requirements include:

- Retaining each cancelled permit for at least one year to facilitate review of Permit-Required Confined Spaces program
- Noting problems encountered during entry on permit to facilitate revisions to program
- Certification of training with name, identity of trainers and training dates
- Reclassification from permit to non-permit space certification with date, location, and signature of person making determination

6.3 General Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of confined space equipment in their areas. They will also be responsible for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads shall be responsible for identifying confined spaces at their worksite/facility. Additionally, they will be responsible for ensuring all confined spaces are evaluated to determine if a permit is required prior to entry.

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Managers/Unit Heads shall also designate entry supervisors and qualified persons. Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will be responsible for knowing where confined and permit-required confined spaces are located at their worksite/facility. They will also be responsible for ensuring permit-required confined spaces are posted with warning signs.

Supervisors will ensure employees are provided with PPE as necessary for their job.

Supervisors are responsible for ensuring that only employees trained and qualified will operate material handling equipment.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

It is the responsibility of the employee to follow all instructions pertaining to confined spaces. Employees are never to enter confined spaces unless authorized by training and job duties.

6.3.4 Entrant

The entrant does the assigned task and is responsible for reviewing the permit before entry. Appendix G presents additional details on the entrant's responsibilities.

6.3.5 Attendant

The attendant is responsible for maintaining communication with the entrant at all times. Appendix G presents additional details on the attendant's responsibilities.

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6.3.6 Entry Supervisor

The entry supervisor is responsible for ensuring that only employees who are trained are allowed to enter confined spaces. The entry supervisor is responsible for ensuring proper permits and safety procedures are followed closely at the jobsite.

The entry supervisor must also be familiar with all hazards associated with the entry operation. He is responsible for all safety precautions, rescue procedures, and safety equipment needed for the operation. Appendix G presents additional details on the entry supervisor's responsibilities.

6.3.7 Qualified Person

Qualified person is responsible for checking the atmosphere of a confined space and correctly reading and using the gas detection instruments. Qualified Person is also responsible for documenting all confined space measurements.

6.3.8 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Additionally, Safety and Loss Control will be responsible for training qualified persons to perform atmospheric testing. Safety and Loss Control will provide guidelines for using air monitoring and gas detection equipment.

The NCDOT Industrial Hygienist will provide training, expertise, and guidance to the qualified person on atmospheric testing. As applicable, the air monitoring data will be evaluated by the Industrial Hygienist for completeness, accuracy, and precision.

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Additionally, the Industrial Hygienist and Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.9 Central Equipment Unit

Central Equipment Unit will ensure that confined space equipment complies with this safety policy and procedure and current standards.

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APPENDIX A: Confined Space Training Certification Form

Location: _____

Instructor: _____

Employee Name: _____ **Social Security #** _____

Has the OSHA required training been completed in the following categories?

Topic	Completion Date	Instructor's Signature	Employee's Initial
Types of Confined Spaces			
Confined Space Hazards			
Atmospheric Testing of Confined Spaces			
Evaluating Confined Spaces			
Cleaning and Ventilation			
Lockout of Confined Spaces			
PPE			
Respirator Use and Care			
Buddy Systems and Emergency Procedures			
Communication Procedures			
Emergency Rescue			
Employees designated to enter confined spaces (includes entrant, attendant, and rescue team) shall also be trained in the following topics	Completion Date	Instructor's Signature	Employee's Initial
Emergency Entry and Exit Procedures			
Applicable Respirators			
First Aid and CPR			
Lockout Barriers at Worksites			
Safety Equipment at Worksites			
Rescue Equipment			
Permit System			
Work Practices			

*Attach Course Roster to this Form
(See [SPP# 1926.21](#) for Course Roster Form)*

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APPENDIX B: Confined Spaces Inventory

Facility: _____
Location: _____
Inventory Date: _____

All permit-required confined spaces shall be posted with signs stating it is permit-required.

Space	Purpose	Hazards	Work Done	Permit Req'd (Y/N)

This inventory must be kept up to date. All operational changes should always be evaluated for its impact on this facility's confined spaces.

APPENDIX C: Atmospheric Testing Procedures

A qualified person shall test spaces a minimum of 3 times at all levels immediately prior to entry.

Figure 5 illustrates the common gases found at each of these levels. Using direct reading instruments with remote sampling capacity, the qualified person shall test for:

- Oxygen level (19.5 percent minimum/maximum 22 percent)
- Potential flammable hazard, not to exceed (10 percent LEL Max.) or Lower Flammable Limit (LFL)
- Toxic materials known or expected to be present (Hydrogen sulfide 10ppm Max) (other gases must be less than the known TLV for that gas)

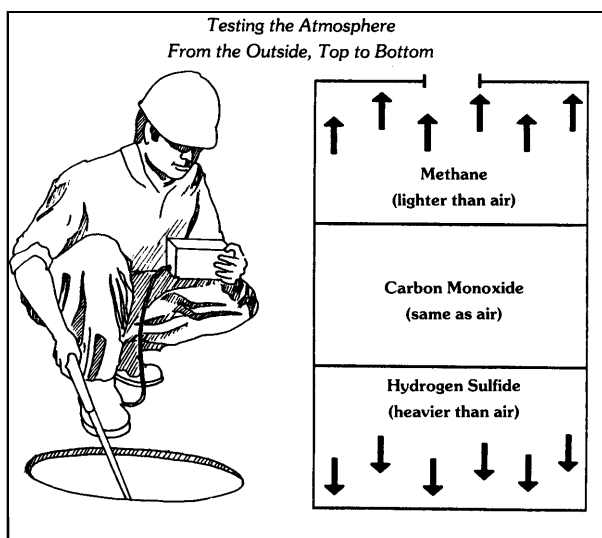


Figure 5

The qualified person shall record all atmospheric test results on the permit. A qualified person shall perform atmospheric testing during occupancy:

- At intervals depending on changing conditions
- No less frequent than hourly
- Continuously

Each testing instrument shall be:

- Calibrated per manufacturer's instructions (instruments out of calibration or that fail field checks cannot be used until calibrated).
- At least annually calibrated by the manufacturer.
- Field checked immediately prior to use. This field check shall include checking with a test gas at least monthly.

SAFETY POLICY & PROCEDURE

APPENDIX D: Confined Space Evaluation Form

Space:_____ Location:_____

Date:_____ Evaluator:_____

Answer the following questions about this confined space.

Hazard Determination

Yes No

☐ ☐

Is there an engulfment potential?

☐ ☐

Does the internal configuration restrict entry or exit (converging walls or sloping and tapered floors)?

Atmospheric Testing

☐ ☐

Is the measured oxygen content below 19.5 or above 23.5 percent?

If not, what's the measurement? _____%

☐ ☐

Are flammable gases, vapors, and mists above 10 percent of the lower

flammable limit? If not, what's the measurement? _____%

☐ ☐

Are airborne combustible dusts at or above the lower flammable liquid?

If not, what's the measurement? _____

☐ ☐

Are toxic contaminants in excess of the Permissible Exposure Limit (PEL) and are they capable of causing death, incapacitation, etc.?

☐ ☐

Are there any other atmospheric conditions that are immediately dangerous to life or health ? If so, what are they?_____

If any of the above questions were answered yes, then the confined space is a permit-required confined space.

SAFETY POLICY & PROCEDURE

APPENDIX E: Confined Space Entry Permit

(Valid for one 8-hour shift only)

All copies of permit will remain at jobsite until job is completed

Location and Description of Confined Space: _____	Date: _____
Scheduled Work to be Done: _____	Time Started: _____
Division/Unit: _____	Time Completed: _____
Persons Authorized to Enter: _____	

Supervisor(s) in Charge of Crews

Type of Crew

Phone/Pager Number

SPECIAL REQUIREMENTS	Yes	No		Yes	No
LockOut - De-energize			Escape Harness		
Lines Broken - Capped or Blanked			Tripod emergency escape unit		
Purge - Flush and vent			Lifelines		
Ventilation			Fire Extinguishers		
Secure Area			Spark Resistant Lighting		
Breathing Apparatus			Protective Clothing		
Resuscitator - Inhalator			Respirator (Air Purifying)		
			Hot Work Permit		

ATMOSPHERIC CHECKS (Valid for one 8-hour shift only)	P.E.L.*	Initial Checks	Checks after Isolation and Ventilation	Periodic Checks							
				Hr 1	Hr 2	Hr 3	Hr 4	Hr 5	Hr 6	Hr 7	Hr 8
% of Oxygen	19.5% to 21%										
% of L.E.L. * *	Any % over 10										
Carbon Monoxide	35 ppm										
Aromatic Hydrocarbon	10 ppm										
Hydrocyanic Acid	4.7 ppm										
Hydrogen Sulfide	10 ppm										
Sulfur Dioxide	2 ppm										
Ammonia	25 ppm										

Qualified Person (Gas Tester) Name: _____

Note: Continuous/periodic tests shall be performed throughout the job. If questions, contact Safety and Loss Control's Safety Engineer or Industrial Hygienist.

SAMPLING EQUIPMENT	Name	Type	Date Calibrated	Identification Number

ATTENDANT PERSON (S)	RESCUE PROCEDURES	COMMUNICATION PROCEDURES
YES <input type="checkbox"/>		
NO <input type="checkbox"/>		

EMERGENCY PROCEDURES

If an emergency should occur-**first summon help**. Do not enter a confined space until qualified help arrives and entry can be made safely. **If a person is down for no apparent cause** you must assume that toxic gases or oxygen deficiency could exist-**do not enter without full protective gear and self-contained breathing device**. Emergency Call _____

Signed (Entry Supervisor) _____

*P.E.L. Permissible Entry Level **L.E.L. Lower Explosive Level

Orig. to Division/Unit

Copy to Safety and Loss Control

SAFETY POLICY & PROCEDURE

APPENDIX F: Confined Space Entry Program Elements

Facility: _____

PROGRAM ELEMENT	CONTACT PERSON
Hazard Identification	_____
Hazard Control	_____
Written Permit System	_____
Posting Confined Spaces	_____
Training	_____
Special Safety Equipment	_____
Written Rescue Plan and Procedures	_____
External Hazard Protection	_____
Contractor Notification	_____
Communication Equipment	_____

NOTES: _____

APPENDIX G: Confined Space Entry Team Responsibilities

A confined space team performs four functions:

- The entrant (pit person) who does the work
- The attendant (observer) who remains outside while the work is being done
- The entry supervisor who authorizes permits
- The rescue team who performs rescue

The entrant:

- Does the assigned task
- Reviews the permit before entry
- Wears appropriate personal protective clothing, as required
- Uses appropriate PPE, as required
- Uses and attends to area and personal monitoring equipment
- Pays attention to own physical reactions that could signal an unsafe condition
- Maintains contact with the attendant and responds to evacuation orders
- If the entrant senses any reaction to the environment, he or she should signal the attendant for help, if necessary, and leave the confined space immediately

The attendant:

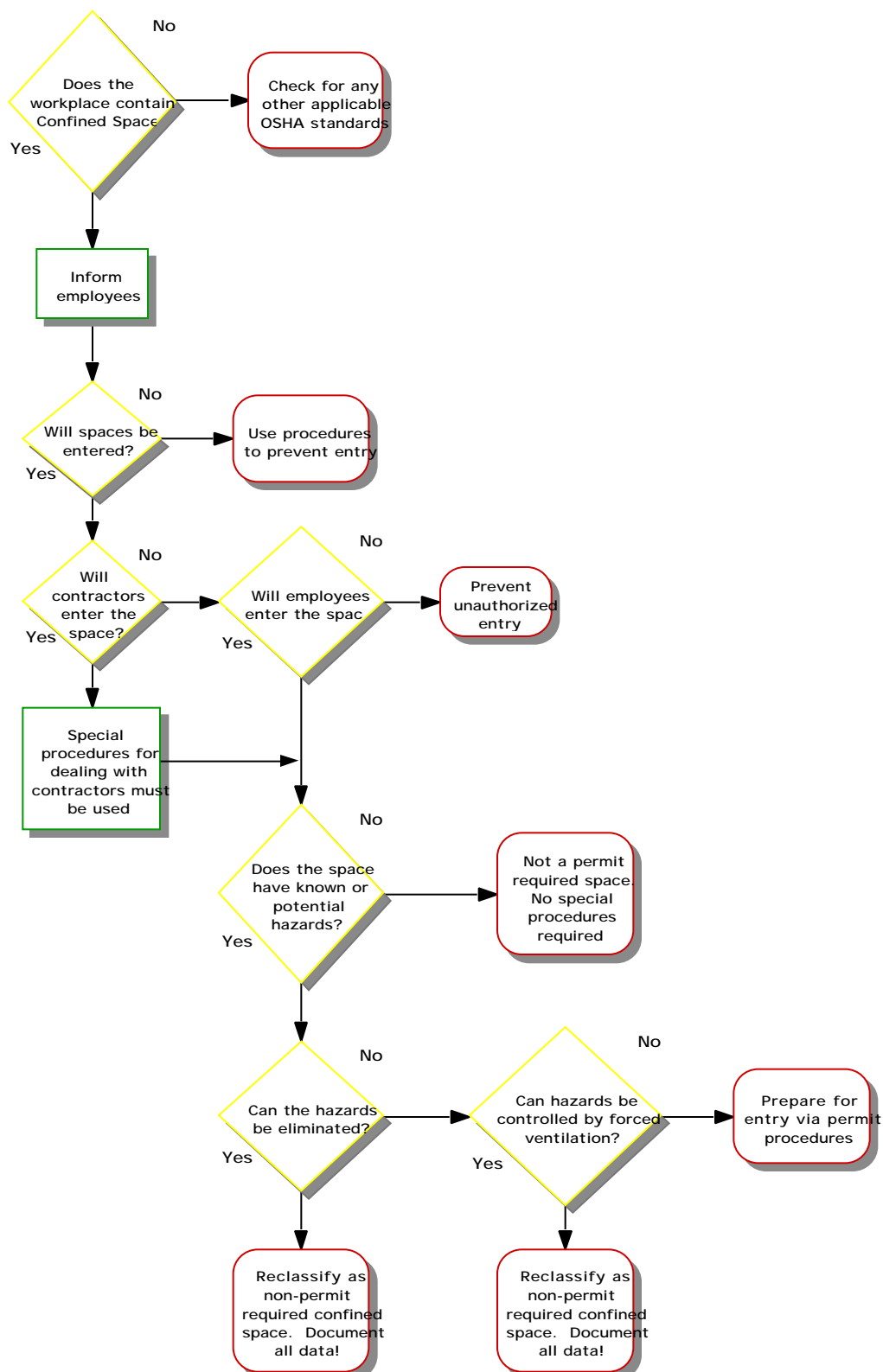
- Reviews the permit before entry
- Keeps track of who is in the space at all times
- Keeps unauthorized people out of the area
- Maintains continuous communication, visual or voice, with the entrant during the entry
- Makes sure the ventilation equipment, if used, is working
- Monitors the atmospheric testing equipment
- Attends to the lifeline, if worn by the entrant
- Attends to the air line, if used, to prevent tangles and kinks
- Remains alert for early symptoms of danger within the space
- Watches for hazards outside and inside the space
- Maintains clear access to and from the space
- Notifies the entrant and orders evacuation if conditions warrant or if the permit limits expire
- Is prepared to call for emergency help, if needed
- Remains at the entry point unless relieved by another trained attendant

APPENDIX G: Confined Space Entry Team Responsibilities (Continued) 2

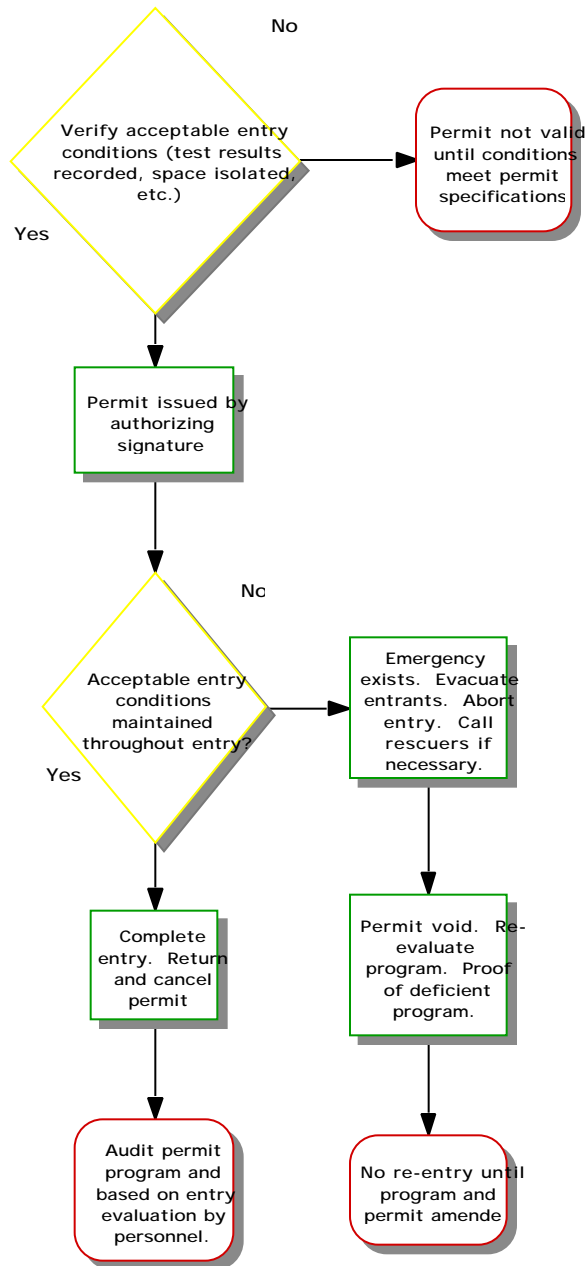
The Entry Supervisor (person authorizing permits) :

- Plans each entry. Planning means to:
 - Describe the work to be done
 - Identify the workers involved
 - Evaluate the hazards of the space
 - Perform (or arrange for) atmospheric testing and monitoring
 - Develop rescue plans
- Ensures that the permit is complete, dated, and signed
- Determines the need for certain equipment
- Ensures atmospheric testing
- Ensures that all necessary procedures, and equipment for safe entry are in effect
- Determines, at “appropriate” intervals, that operations remain acceptable
- Cancels the permit and terminates the work if the conditions are not acceptable
- Trains (or provides training for) all workers on the Confined Space Entry Team
- Keeps records on training, safety drills, test results, equipment inspections, and equipment maintenance.
- Cancels the permit and secures the space when the work is done
- Determines if a written rescue plan is necessary for a particular confined space entry
- Verifies that emergency help is available and that the method of summoning help is operable

APPENDIX H: Confined Space Decision Tree Flowchart



APPENDIX I: Confined Space Entry Flowchart



Lockout/Tagout**SPP# 1910.147****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish methods for isolating machines or equipment from energy sources to permit routine maintenance and servicing of those machines and equipment by North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Uncontrolled energy is a hazard to operators and other employees in the area of the machinery, equipment, or processes. Those who service and maintain machinery or equipment are especially vulnerable because the machinery or equipment might become energized while being serviced or stored energy might be unexpectedly released. A lockout is a method of keeping equipment from being set in motion and endangering employees.

SAFETY POLICY & PROCEDURE

This safety policy and procedure provides guidelines for isolating machines or equipment from energy sources. It emphasizes the two major components of the lockout/tagout requirements of training and equipment surveys. The training component is organized into:

- General training requirements
- Authorized employee training
- Affected employee training
- Supervisor training

The training component addresses all the procedural details of an effective lockout/tagout program. The equipment survey component addresses the identifications of energy sources and the assignment of lockout/tagout devices for those energy sources.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control.

This safety policy and procedure affects employees who service, maintain, and operate stationery equipment and machines.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.147).

4.0 Policy

It is the policy of the North Carolina Department of Transportation (NCDOT) to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all energized machines and equipment must be locked out and/or tagged out before any maintenance or servicing is performed. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Lockout/Tagout will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Lockout/Tagout. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's Lockout/Tagout Program.

6.1 Definitions

Affected Employee

An employee whose job duties require operation or use of a machine or piece of equipment in a location in which servicing or maintenance is being performed under Lockout/Tagout Procedures.

Authorized Employee

An employee who lockouts or tagouts a machine or piece of equipment in order to perform servicing or maintenance on that machine or piece of equipment. An affected employee becomes the authorized employee when that employee's duties require him or her to perform the service or maintenance covered under this policy.

Capable of Being Locked Out

An energy isolating device capable of being locked out if it has a hasp or other means of attachment through which a lock can be affixed to the equipment or machine.

Energy Isolating Device

A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and additionally by which no pole can be operated independently; a line valve; a blind; or any similar device used to block or isolate energy. Push buttons, selector switches, and other control circuit-type devices are not energy isolating devices.

Energy Source

Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Hasp

Multiple lockout or tagout device.
(See Figure 1.)

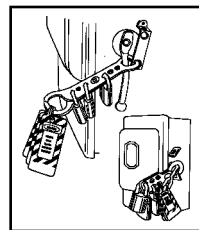


Figure 1

Lockout

The placement of a lockout device on an energy isolating device, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

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Lockout Device

A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in a safe position to prevent the energizing of a machine or piece of equipment. (See Figure 2.)

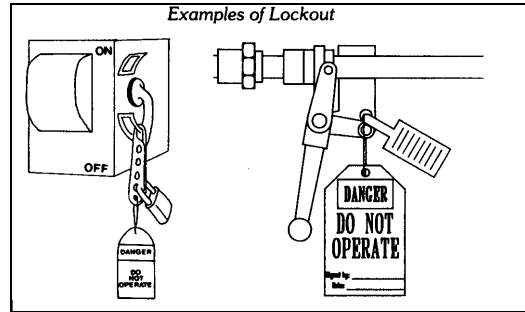


Figure 2

Servicing and/or Maintenance

Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubricating, cleaning, or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to unexpected energization or startup of the equipment or release of hazardous energy.

Setting Up

Any work performed to prepare a machine or equipment to perform its normal production operation.

Tagout

The placement of a tagout device or an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout Device

A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- General Training Requirements
- Authorized Employee Training
- Affected Employee Training
- Supervisor Training
- Equipment Survey

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6.2.1 General Training Requirements

General training requirements for the Lockout/Tagout program shall consist of:

- Basic lockout/tagout training
- Training on the limitations of tags
- Authorized and affected employee retraining
- Certification of lockout/tagout training

Basic lockout/tagout training shall communicate a basic awareness of the procedures and skills that employees are required to possess. This training shall ensure that:

- Each authorized employee receives training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control
- Each affected employee be instructed in the purpose and use of the energy control procedure
- All other employees be instructed when work operations are in an area where energy control procedures are used

Training on the limitations of tags must be provided to the identified employees. Tagout systems are not completely foolproof. Instructions should include, among others, the following examples of tag limitations:

- Tags are essentially warning devices affixed to energy isolating devices and do not provide the physical restraint on those devices that is provided by a lock
- When a tag is attached to an energy isolating means, it is not to be removed without authorization and it is never to be bypassed, ignored, or otherwise defeated
- In order to be effective, tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area
- Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace
- Tags may evoke a false sense of security and their meaning needs to be understood as parts of the overall energy control program
- Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use

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Authorized and affected employee retraining is required when:

- There is a change in their job assignments, a change in machines, equipment, or processes that presents a new hazard, or when there is a change in the energy control procedure
- A NCDOT supervisor has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures

This retraining shall establish employee proficiency and introduce new or revised control, methods and procedures, as necessary.

Certification of lockout/tagout training must be accomplished and updated when such training has taken place. The certification shall contain each employee's name, job title, division/unit, and dates of training. Appendices A and B contain Lockout/Tagout training certification forms for authorized and affected employees respectively.

6.2.2 Authorized Employee Training

Authorized employees are those who use lockout/tagout devices. This training will be the responsibility of the supervisor.

Training requirements for authorized employees will include the following:

- Purpose of the standard and hazards controlled
- When the standard applies
- Definitions of terms used
- Equipment used for lockout/tagout:
 - standardized appearance
 - personal identification procedures
- Procedures, including:
 - preparation for shutdown
 - shutdown, isolation, blocking, and securing
 - placement, removal, and transfer of devices
 - release of stored energy
 - testing to verify effectiveness of energy control
 - release from lockout/tagout:
 - procedural requirements
 - release if employee who applied device is no longer at facility
- Special procedures and rules for tagout systems
- Special procedures for changes of shifts and personnel changes
- Special procedures and practices for group lockout/tagout:
 - procedure
 - authority for lockout/tagout in group situations
- Inspection program
- Communication and reporting of problems

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Appendix C presents NCDOT's lockout/tagout procedure for authorized employees.

6.2.3 Affected Employee Training

Affected employees are those who operate equipment locked or tagged, or employees who work in the area where the devices are in use. Affected employee training may cover:

- Introduction to procedures outlined above for authorized employees
- Prohibition against energizing any machine or piece of equipment that is locked or tagged out

6.2.4 Supervisor Training

In addition to the employee training mentioned above, supervisors will receive additional training which includes the following elements:

- Determination of machinery and equipment to be included in the Lockout/Tagout Program
- Energy isolation points of each piece or class of machinery and equipment
- Training requirements, scheduling, responsibility
- Annual retraining circumstances and requirements for employees
- Inspection requirements and responsibilities
- Outside contractor personnel requirements

6.2.5 Equipment Survey

A survey is required to identify all isolating devices prior to a lockout/tagout event. The purpose of the survey is to determine which switch(s), valve(s), or other energy isolating devices applies to the equipment to be locked out or tagged out. Appendix D contains forms for performing an equipment survey for a facility.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads shall be responsible for the completion of a survey of machinery and equipment within their area to determine which machinery and equipment should be included in the Lockout/Tagout Equipment Inventory Program.

Managers/Unit Heads shall be responsible for identifying all affected and authorized employees.

SAFETY POLICY & PROCEDURE

Manager/Unit Heads shall ensure that the necessary funding is available for purchase of the required lockout/tagout safety equipment. Managers/Unit Heads will also ensure annual compliance with this safety policy and procedure through their inspection and auditing processes.

Managers/Unit Heads are responsible for coordinating required training with Safety and Loss Control.

6.3.2 Supervisors

Supervisors shall be responsible for ensuring that this safety policy and procedure is implemented in their areas.

Supervisors shall be responsible for ensuring that an adequate supply of locks, tags, and other safety equipment is available and is utilized in accordance with this safety policy and procedure.

Supervisors shall be responsible for the training of the employees and for ensuring that the training meets the requirements of this safety policy and procedure.

Supervisors shall be responsible for maintaining training needs in accordance with this safety and policy.

6.3.3 Authorized Employees

Authorized employees shall be responsible for following NCDOT's lockout/tagout procedures before any maintenance or servicing activities are begun.

Authorized employees will be responsible for notifying affected employees before beginning a lockout/tagout procedure on a piece of equipment or machinery.

Authorized employees shall report to their supervisors any changes in the machinery or equipment that would require a change in the lockout/tagout procedure.

6.3.4 Affected Employees

Affected employees shall attend the required training. This training will be given at least annually or when new employees or equipment are introduced into the work environment. Records for training will be maintained by the office in which the equipment and employees are located. This training will include electrical, hydraulic, chemical, thermal, and any other energy sources that have the ability to release without warning.

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Affected employees shall ensure that all precautions required by this safety policy and procedure be observed.

Affected employees shall report to their supervisors any changes in the machinery or equipment that would require a change in the lockout/tagout procedure.

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased Locks and Tags comply with this safety policy and procedure.

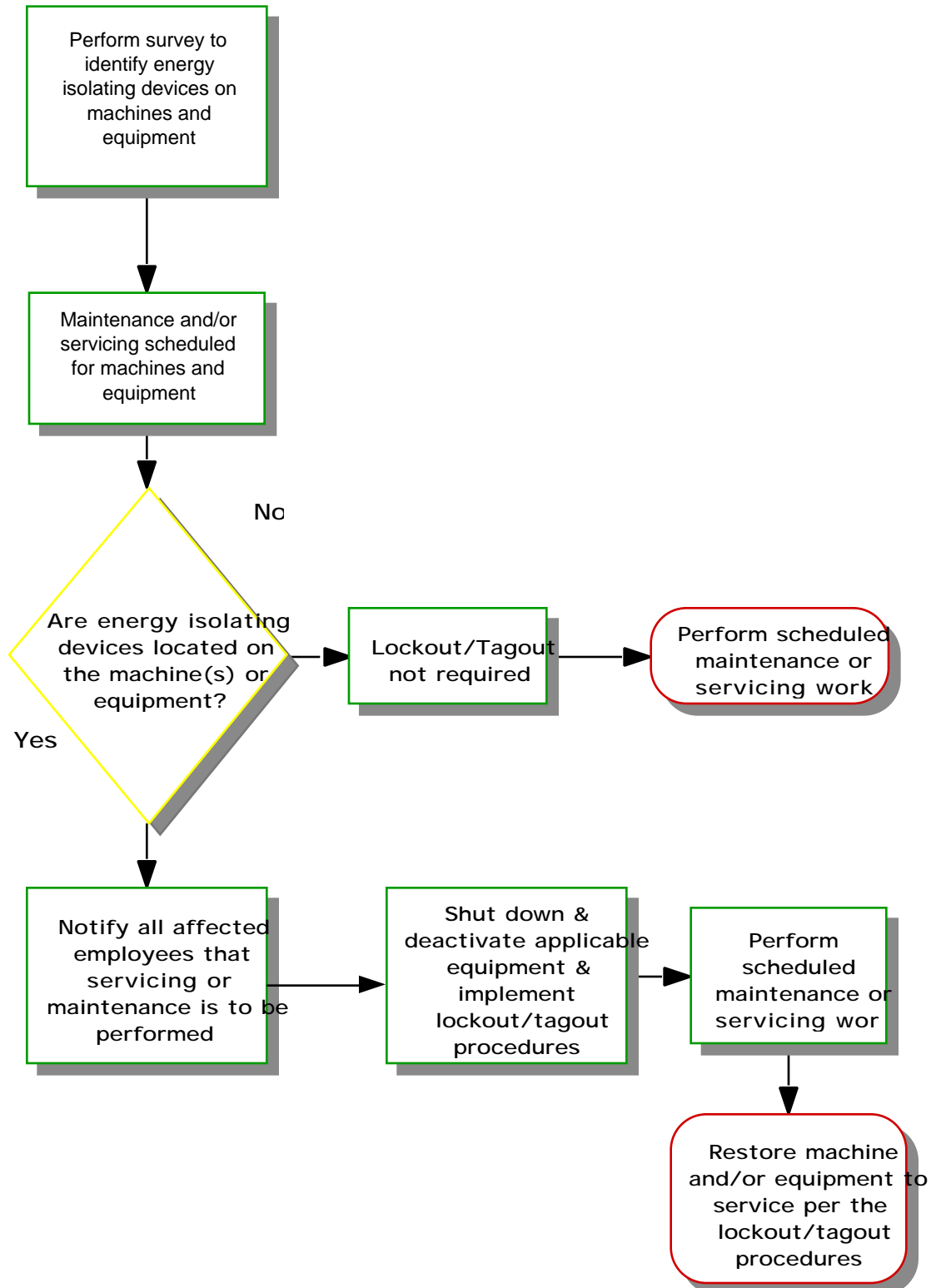
Safety and Loss Control shall be responsible for monitoring the Lockout/Tagout Program and any changes in the machinery and equipment that may require modification of the Program.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.6 Central Equipment Unit

Central Equipment Unit shall maintain an inventory of lockout tags and hasps that comply with this safety policy and procedure.

Lockout/Tagout Flowchart



SAFETY POLICY & PROCEDURE

APPENDIX A: Certification Training Form for Authorized Employees

Facility:

Location:

AUTHORIZED EMPLOYEE TRAINING

Lockout/tagout for AUTHORIZED employees includes special instructions concerning scope, purpose, rules, and techniques for lockout/tagout of hazard energy sources including, but not limited to:

- ☐ Intended use of the procedure
- ☐ Steps for shutting down, isolating, holding, and securing
- ☐ Steps for placement, removal, and transfer of lockout/tagout devices
- ☐ Requirements for testing to determine and verify effectiveness of lockout/tagout devices
- ☐ Other measures

Employee's Name	Job Title	Division/ Unit	Comments	AUTHORIZED	
				Date	Supervisor
Training Conducted by:		Date:	Reviewed by:	Date:	

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APPENDIX B: Certification Training Form for Affected Employees

Facility:	Location:				
<p>AFFECTED and OTHER EMPLOYEE TRAINING</p> <p>Lockout/tagout for AFFECTED and OTHER employees includes special instructions concerning scope, purpose, rules, and techniques for lockout/tagout of hazard energy sources including, but not limited to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Intended use of the procedure <input type="checkbox"/> Steps for shutting down, isolating, holding, and securing <input type="checkbox"/> Steps for placement, removal, and transfer of lockout/tagout devices <input type="checkbox"/> Requirements for testing to determine and verify effectiveness of lockout/tagout devices <input type="checkbox"/> Other measures _____ 					
Employee's Name	Job Title	Division/ Unit	Comments	AUTHORIZED	
				Date	Supervisor
Training Conducted by:		Date:	Reviewed by:		Date:

APPENDIX C: Lockout/Tagout Procedure

Sequence of Lockout or Tagout

- Complete survey and identify all isolating devices to determine which switch(s), valve(s), or other energy isolating devices applies to the equipment to be locked out or tagged out. (See Appendix D for sample survey forms.)
- Notify all affected employees that a lockout or tagout system is being implemented and the reason why.
- Shut down machine or equipment by normal stopping procedure.
- Operate the ON switch, valve, or other energy isolating devices(s) so that the equipment is isolated from its energy source(s). Stored energy (such as that in springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as repositioning, blocking, bleeding down, etc.
- Lockout and/or tagout the energy isolating devices with assigned individual lock(s) or tag(s). **If tags are to be used, tag justification forms (Appendix E) must be completed.**

To verify that the energy sources are disconnected:

- Operate the ON switch or normal operating controls. Ensure that no personnel are exposed before operating the controls. (Return operating control to neutral or off position after test.)
- The equipment is now locked out or tagged out.

Restoring Machines or Equipment to Normal Production Operations

- After servicing and/or maintenance are complete and equipment is ready for normal production operations, check the area around the machines or equipment to ensure that no one is exposed.
- After all tools, parts, etc. have been removed from the machine or equipment, guards have been reinstalled, and employees are in the clear, remove all lockout or tagout devices. Operate the energy isolating devices to restore energy to the machine or equipment.

Procedure Involving More Than One Person

In the preceding steps, if more than one individual is required to lockout or tagout equipment, each shall place his or her own personal lockout device or tagout device on the energy isolating device(s). When an energy isolating device cannot accept multiple locks or tags, a multiple lockout or tagout device (hasp) may be used.

If lockout is used, a single lock may be used to lockout the machine or equipment with the key being placed in a lockout box or cabinet which allows the use of multiple locks to secure it. Each employee will then use his or her own lock to secure the box or cabinet. As each person no longer needs to maintain his or her lockout protection that person will remove his or her lock from the box or cabinet.

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APPENDIX D: Lockout/Tagout Equipment and Energy Source Survey Form

TYPES OF HAZARDOUS ENERGY AT THIS FACILITY:

Facility Name _____

	Yes	No	General Description and Location
Electrical:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Pneumatic:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hydraulic:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Stored:	<input type="checkbox"/>	<input type="checkbox"/>	_____

ELECTRICAL EQUIPMENT

Equipment Name	Service Panel Disconnect	Identification Number	Lockout/Tagout Device Needed

Comments

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APPENDIX D: Lockout/Tagout Equipment and Energy Source Survey Form (Continued)

PNEUMATIC EQUIPMENT

Equipment Name	Isolation Point	Identification Number	Lockout/Tagout Device

HYDRAULIC EQUIPMENT

Equipment Name	Isolation Point	Identification Number	Lockout/Tagout Device
Comments			

STORED ENERGY EQUIPMENT

[illegible]

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APPENDIX E: Tagout System Justification

Location:

FULL EMPLOYEE PROTECTION: If you cannot indicate a “yes” answer to all of the following items, do not use the tagout system.

Yes No

- ☐ ☐ Tagout system provides full employee protection.
- ☐ ☐ Tagout devices placed at the same location where the lockout device would have been placed.

Yes No

- ☐ ☐ Tagout system provides equivalent safety to the lockout program.
- ☐ ☐ Employees fully comply with all tagout-related provisions.

ADDITIONAL SAFETY MEASURES: Check measure(s) used to provide equivalent employee protection.

- ☐ Isolating circuit element removal
- ☐ Control switches blocked
- ☐ Extra disconnecting device opened
- ☐ Removal of valve handles
- ☐ Other _____

TAGOUT DEVICES: The tagout device must satisfy each of the following criterion:

- | | |
|---|---|
| <input type="checkbox"/> Singularity identified | <input type="checkbox"/> Exposure does not cause deterioration |
| <input type="checkbox"/> Only devices used for controlling energy | <input type="checkbox"/> Does not deteriorate in corrosive environment |
| <input type="checkbox"/> Not used for other purposes | <input type="checkbox"/> Standardized |
| <input type="checkbox"/> Durable/Substantial | <input type="checkbox"/> Color |
| <input type="checkbox"/> Withstand environment | <input type="checkbox"/> Shape and Size |
| <input type="checkbox"/> Non-reusable | <input type="checkbox"/> Print and Format |
| <input type="checkbox"/> Attachable by hand | <input type="checkbox"/> Minimum unlocking strength of no less than 50 pounds |
| <input type="checkbox"/> Self-locking | <input type="checkbox"/> Equivalent to a one-piece, all environment-tolerant, nylon cable tie |
| <input type="checkbox"/> Indicates employee identity | |

Warning: The tagout device must:

- ☐ Warn against hazardous conditions
- ☐ Include Do Not Start, Open, Close, Energize, Operate, etc.

Tag Limitations: Employees should be trained to know that:

- | | |
|---|--|
| <input type="checkbox"/> Tags are warning devices | <input type="checkbox"/> Tags are part of the overall security |
| <input type="checkbox"/> Tags do not provide physical restraint | <input type="checkbox"/> Tags must be securely attached |
| <input type="checkbox"/> Tags must never be removed without authorization | <input type="checkbox"/> Tags must never be bypassed, ignored, or defeated |
| <input type="checkbox"/> Tags may evoke false sense of security | |

SAFETY POLICY & PROCEDURE

APPENDIX E: Tagout System Justification (Continued) 2

EMPLOYEE TRAINING ON LOCKOUT/TAGOUT

DATES:

LOCATION:

DESCRIPTION:

REASON(S) FOR USING TAGOUT SYSTEM

HOW EQUIVALENT EMPLOYEE PROTECTION PROVIDED

OTHER COMMENTS

Conducted by:

Date:

Authorized By:

Date:

Safety Color Markings for Hazards

SPP# 1910.144

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the use of safety color markings to identify hazards.

2.0 Scope and Applicability

Color coding is a standard way of quickly transmitting information. The North Carolina Department of Transportation (NCDOT) has adopted color codes based on OSHA and ANSI standards to convey safety information.

This safety policy and procedure provides guidelines for identifying hazards through safety color markings. It includes provisions for training, detailed discussion of color requirements for identifying hazards, and brief discussion of safety color compliance audits.

This document also details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This safety policy and procedure affects employees in Traffic Services, Bridge Maintenance, and Central Equipment Unit. It also affects other employees who apply safety colors on equipment and materials for identification of hazards associated with the relevant equipment and materials.

SAFETY POLICY & PROCEDURE

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.145) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.200).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, standard color coding will be used throughout NCDOT to minimize these hazards. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Safety Color Markings will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's policy on Safety Color Markings for Hazards. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition that is not safety color marked to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities.

6.1 Definitions

Color Codes

Coloring scheme that associates colors with different types of hazards.

6.2 General Provisions

This section details the provisions of this policy with each provision discussed in a separate subsection. These provisions are:

- Training
- Marking
- Audits

SAFETY POLICY & PROCEDURE

6.2.1 Training

Training will be provided to affected employees. This training should include the following subject areas:

- Why hazards and dangers should be marked
- Color codes
- What equipment and materials should be marked

6.2.2 Marking

Safety color marking shall be uniform throughout NCDOT. Hazards within NCDOT shall be marked according to the following:

- **Red** is recommended for identifying fire protection equipment, danger, and emergency stops on machines.
- **Yellow** because of its high visibility is the standard color for marking hazards that may result in accidents from slipping, falling, striking against, etc.
- **Green** in combination with white, such as the green cross on a white background, designates the location of first aid and safety equipment.
- **Black and White** and combinations of the two in strips or checks are used for housekeeping and traffic markings.
- **Orange** is the standard color to highlight hazardous parts of machines or electrical equipment, such as exposed edges of cutting devices, the inside of removed guards, and the doors and covers of switch boxes. Also, orange is used for biological and similar types of hazards.
- **Reddish-Purple (magenta)** identifies radiation hazards, such as radioactive materials in rooms and containers.

For lettering, text, and background colors on equipment and materials, other colors are used but not limited to the following:

- White
- Black
- Yellow

For details and guidelines for marking accident prevention signs and tags, see [SPP# 1910.145, Accident Prevention Signs and Tags](#).

SAFETY POLICY & PROCEDURE

Some examples of equipment with safety color markings include:

- Containers of flammable liquids having a flash point at or below 80°F painted red with either a yellow band around the can or the name of the contents painted on the can in yellow
- Red lights at barricades
- Emergency stop bars (stop buttons) on hazardous machines painted red

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that funding is available to effectively implement this safety policy and procedure. They will also ensure that the appropriate employees are identified for training and that training is made available.

Manager/Unit Heads will also be responsible for identifying the employees affected by this safety policy and procedure. They will obtain and coordinate the required training for the affected employees and will ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that hazardous conditions and locations are safety color marked. Additionally, supervisors will ensure that the appropriate employees receive training in recognizing safety color markings and hazards associated with these colors.

6.3.3 Employees

Employees are to report any unmarked hazardous conditions or locations to their supervisors. Employees shall recognize safety color markings and hazards associated with these colors.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will conduct random audits of facilities and hazards to assure that they are marked consistent with the hazard.

Additionally, Safety and Loss Control will assist in developing or securing required training.

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6.3.5 Central Equipment Unit

Central Equipment Unit will support Divisions/Units with the selection and purchase of equipment, signs, and marking materials. Central Equipment Unit Specifications Committee will ensure that equipment purchases meet the requirements of this safety policy and procedure.

Access to Medical Records

SPP# 1910.20

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1.0 Purpose

The purpose of this safety policy and procedure is to establish the guidelines and procedures through which employees will be able to obtain and gain access to North Carolina Department of Transportation (NCDOT) maintained exposure and medical records. These exposure and medical records are those resulting from employment related exposures, injuries, and/or illnesses.

2.0 Scope and Applicability

NCDOT workers may be exposed to toxic substances and harmful physical agents to an extent that may severely impair their health. Workers must be informed about the toxic exposures they face and their potential health effects.

This safety policy and procedure provides guidelines for employees to obtain their exposure and medical records. It includes provisions on training, retention requirements for employee exposure and medical records, and response time to employee requests for exposure and medical records. Additionally, guidelines are presented on physician review of employee medical records, OSHA access to medical records, and information that must be shared with new employees.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

SAFETY POLICY & PROCEDURE

This document affects all NCDOT employees who have been exposed to toxic substances and harmful physical agents due to their job duties.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.20) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.33).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards and to comply with applicable standards and regulations set forth by the Occupational Safety and Health Administration.

In accordance, NCDOT will provide all exposure and medical records when properly requested as outlined in this safety policy and procedure. NCDOT will ensure that those employees who request their exposure and medical records are provided with confidential, fair, and equal treatment.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Access to Medical Records.

It is the general responsibility of NCDOT to ensure that each employee has access to all exposure and medical records pertaining to their present or past employment with NCDOT. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides definitions, establishes general provisions, and identifies responsibilities regarding access to employee exposure and medical records.

6.1 Definitions

Access

The right and opportunity to examine, copy, or use any or all exposure and medical records.

POLICY & PROCEDURES

Designated Representative

Any individual or organization to whom an employee gives written authorization to exercise a right of access to exposure or medical records.

Employee

An individual who is employed by NCDOT and who is being assigned or transferred to work where there will be exposure to toxic substances or harmful physical agents. In a case where the employee is deceased, the employee's legal representative may directly exercise all of the employee's rights under this policy.

Employee Exposure Record

A record containing information on the type of environment or hazards present in the workplace.

Employee Medical Record

A record concerning the health status of an employee which is made or maintained by a physician, nurse, or other health care personnel.

Exposure

A condition that occurs when an employee is subjected to toxic or hazardous environments as a result of his or her job duties.

Health Professional

A physician, occupational health nurse, industrial hygienist, toxicologist, or epidemiologist providing medical care or other occupational health services to exposed employees.

Record

Any item, collection, or grouping of information regardless of the form or process by which it is maintained.

Toxic Substance

Any chemical substance, biological agent (bacteria, virus, etc.), or physical stress (noise, heat, cold, vibration, etc.) to which employees could have been exposed as a result of performing their job function.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each element discussed in a separate subsection. These provisions are:

- Access to Records
- Employee Exposure and Medical Records
- NCDOT Representation by a Physician
- OSHA Access to Records
- Employee Information

SAFETY POLICY & PROCEDURE

6.2.1 Access to Records

Whenever an employee or a designated representative of an employee requests access to exposure and/or medical records, NCDOT will provide these documents within 15 working days. If records cannot be provided within this time period, the employee or representative must be informed and given a date on which the records will be provided along with a reason for the delay. These records will be provided to the employee or representative at no cost for reproduction or for the document search itself.

6.2.2 Employee Exposure and Medical Records

Upon request, NCDOT must provide the employee or employee's designated representative access to employee exposure records. If no records exist, the employer must provide records of other employees with job duties similar to those of the employee. Access to exposure records does not require the written consent of the other employees.

In addition, these exposure records must reasonably indicate the identity, amount, and nature of the toxic substances or harmful physical agents to which the employee has been exposed.

NCDOT also must provide employees and their designated representatives access to employee medical records. Access to the medical records of another employee may be provided only with the written consent of that employee. A request for medical records can be made by using the form (or one substantially similar) shown in Appendix A.

NCDOT is responsible for maintaining employee medical records for the duration of employment plus 30 years. This recordkeeping does not include health insurance claims, first aid records (not including medical histories) of one-time treatment, and medical records of employees who have worked less than a year for NCDOT. Employee exposure records and data analysis are to be maintained for 30 years.

It is the responsibility of the employee to initiate any request for access to his or her medical records as outlined in this safety policy and procedure. (See Appendix A.)

6.2.3 NCDOT Representation by a Physician

NCDOT may request that a physician be appointed to review medical records with the employee or employee's designated representative to ensure records are reviewed and properly interpreted. The physician may deny the employee access to records if the physician detects a situation which may be detrimental to the health of the employee such as the identification of terminal illness or a psychiatric condition.

SAFETY POLICY & PROCEDURE

In such cases, the employee's designated representative may request the records even if it is known that the representative may disclose the information to the employee.

6.2.4 OSHA Access to Records

Upon receiving a written request from OSHA, NCDOT will supply OSHA with any exposure or medical records for analysis. A copy of this request must be posted in a conspicuous place for at least 15 working days.

6.2.5 Employee Information

New NCDOT employees will be informed of the following information:

- The existence, location, and availability of any records covered by this safety policy and procedure
- The person responsible for maintaining and providing access to these records
- Employee's rights under this safety policy and procedure

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for maintaining employees' exposure and medical records and for ensuring compliance with this safety policy and procedure.

Managers/Unit Heads are also responsible for providing employees with copies of their exposure and medical records when properly requested.

Managers/Unit Heads will ensure the confidentiality of employees' medical records.

6.3.2 Supervisors

Supervisors will be responsible for educating and training employees about their rights under this safety policy and procedure.

6.3.3 Employees

Exposure and medical records may be kept in an employee's personnel files, in a physician's office, or contained within claim files such as Workers' Compensation.

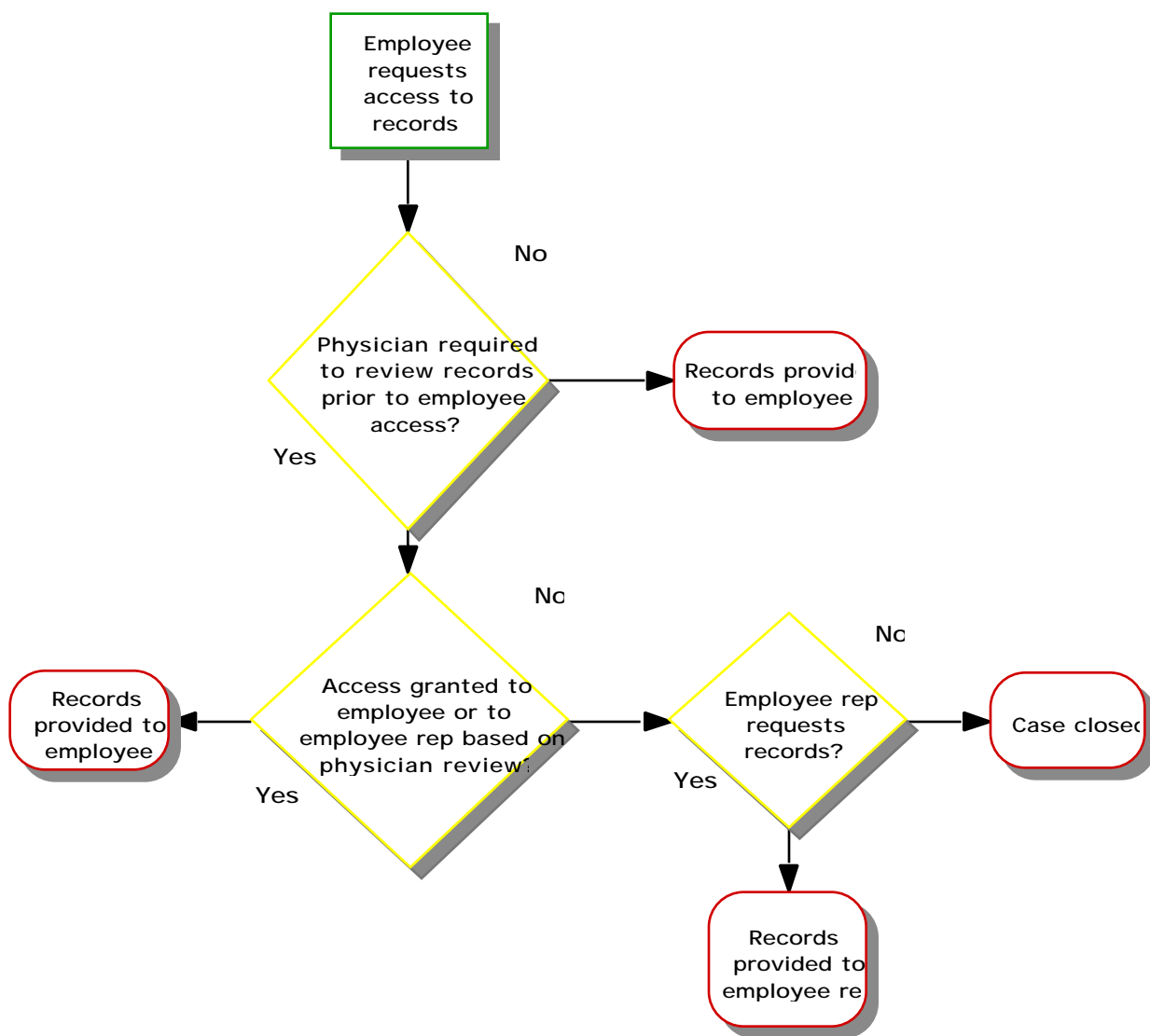
SAFETY POLICY & PROCEDURE

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads or others on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training for the effective implementation of this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Access to Medical Records Flow Chart



SAFETY POLICY & PROCEDURE

APPENDIX A: Employee Request for Access to Medical Records

I, _____, hereby request access to any and all employment-related medical records, maintained on my behalf, by NCDOT. This request, unless specifically noted below, includes all employment-related medical records maintained by NCDOT and/or any private health care provider for which NCDOT has knowledge. I acknowledge that this request pertains only to access of employment related medical records as detailed in NCDOT's Safety Policy and Procedure # 1910.20.

Specific Records Being Requested

Employee Signature

_____/_____/_____
Date

_____-_____-_____
Social Security Number

DESIGNATED REPRESENTATIVE CERTIFICATION

I, _____, certify that I am the designated representative for the above named employee and that he/she has authorized me to obtain the medical records as indicated above. Please forward these records to my attention at the address below.

Name

Employee Signature

Address

Representative Signature

City State Zip Code

_____/_____/_____
Date

SUBMIT COMPLETED FORM TO YOUR MANAGER OR UNIT HEAD

Aerial Truck Operations

SPP# 1910.67

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for aerial truck operations in the servicing of traffic signals within the North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

This safety policy and procedure provides guidelines for safe aerial truck operations to protect traffic control technicians and other NCDOT employees and to eliminate collisions between aerial buckets and large trucks. It includes provisions for training, brief discussion of general hazards of aerial truck operations, a listing of some of the common aerial truck operations, and recommended safe work practices.

This document also details the areas of responsibility for managers/unit heads, supervisors, traffic control technicians, traffic control technician assistants, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects NCDOT employees in Traffic Services and Traffic Engineering and employees in any other operation who as a result of their job duties are exposed to aerial truck hazards due to the servicing of traffic signals.

SAFETY POLICY & PROCEDURE

3.0 Reference

This policy is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.67), Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.556), and NCDOT traffic control practices.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, when an aerial truck device is used, two or more individuals will always be on scene during the traffic signal servicing operation. When aerial truck hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Aerial Truck Operations will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Aerial Truck Operations. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined under Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Aerial Truck Operations.

6.1 Definitions

Aerial Truck

A truck that is designed to lift workers up in a bucket or platform by hydraulic lifting mechanisms.

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6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Aerial Truck Hazards
- Aerial Truck Operations
- Aerial Truck Safe Work Practices

6.2.1 Training

Traffic control technicians and other employees as applicable (assistants, etc.) shall be instructed in the recognition and avoidance of hazards associated with aerial truck hazards.

Special training is required for traffic control technicians who operate the aerial truck and must set up traffic control as applicable. Those employees must be properly trained in the procedures for the safe performance of their assigned duties.

This training shall be made available upon initial employment or job re-assignment. Refresher training shall be provided upon the discretion of the supervisor.

6.2.2 Aerial Truck Hazards

The major hazards associated with aerial truck devices when performing traffic signal servicing include:

- Aerial devices coming into contact with electrical wiring
- Vehicle traffic
- Inclement weather during emergency call outs
- Fall hazards
- Aerial equipment upset

This list is not all inclusive. There are many other various hazards that arise with each situation and that must be properly anticipated, recognized, avoided, and controlled.

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6.2.3 Aerial Truck Operations

The servicing of traffic signals is several distinct operations. These operations are:

- Construction or new installation of a signal system
- Planned maintenance of a signal system
- Emergency repair of a signal system
- Emergency call out

Construction or new installation of a signal system involves setting poles, stringing span wire, hanging signal heads, running cable, cutting pavement, installing loop detectors, plowing loop wire in the shoulders, and installing the cabinet hardware.

Planned maintenance of a signal system involves replacing bulbs, cleaning the signal heads, adjusting the alignment of the heads and any other items that may apply during this type of operation.

Emergency repair of a signal system involves repairs due to accidents, storm damage, or electrical malfunction of the individual signal head.

Emergency call out involves emergency operations after normal working hours either at night or on holidays and weekends.

6.2.4 Aerial Truck Safe Work Practices

The following safe work practices shall be followed when aerial truck devices are used in the servicing of traffic signals:

- Two or more individuals will be on scene during the traffic servicing operation
- The second individual (individual on the ground) shall be trained in first aid
- Aerial truck is not to be touched if it comes into contact with electrical wiring
- The primary technician shall not belt off to an adjacent pole, structure, or equipment while working from the aerial bucket
- The primary technician shall wear a body belt with a lanyard attached to the aerial bucket when working in the aerial lift
- Sufficient signs, racks, and traffic cones shall be available for the appropriate traffic control
- The ground person shall be instructed in the operation of the aerial device
- Emergency phone numbers and location of cellular phones shall be readily known and accessible

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Technicians should also refer to the aerial lift manufacturer's safe operating practices for additional information.

Technicians can respond to trouble calls alone if the trouble is known to be cabinet work, where all the work is off the road and not involving traffic control or aerial work. Otherwise, two or more individuals should always be on the scene of traffic signal servicing.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that the necessary traffic servicing and traffic control equipment and supplies are budgeted for and acquired. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance through their auditing process.

Managers/Unit Heads will ensure that supervisors are capable of recognizing and taking steps to avoid the exposure of any employee to aerial truck hazards due to traffic signal servicing.

6.3.2 Supervisors

Supervisors will ensure that all traffic control technicians have received the required training prior to performing any duties. They shall also ensure that the traffic control technicians have been instructed in the recognition and avoidance of hazards due to aerial truck operations.

Supervisors will ensure that the ground employees (helpers, additional technicians) have been instructed in the operation and hazards of aerial truck devices.

6.3.3 Traffic Control Technician

Traffic control technicians shall be responsible for knowing the potential hazards associated with aerial truck operations. They will also be responsible for refraining from work if the hazards due to the traffic servicing operation have not been addressed. Additionally, they will be responsible for instructing the ground personnel of any hazards during the traffic signal servicing operation.

SAFETY POLICY & PROCEDURE

6.3.4 Traffic Control Technician Assistants

Traffic control technician assistants shall be responsible for assisting the traffic control technician in the aerial bucket. They shall be trained in first aid and be familiar in flagging and directing traffic as the situation warrants.

6.3.5 Employees

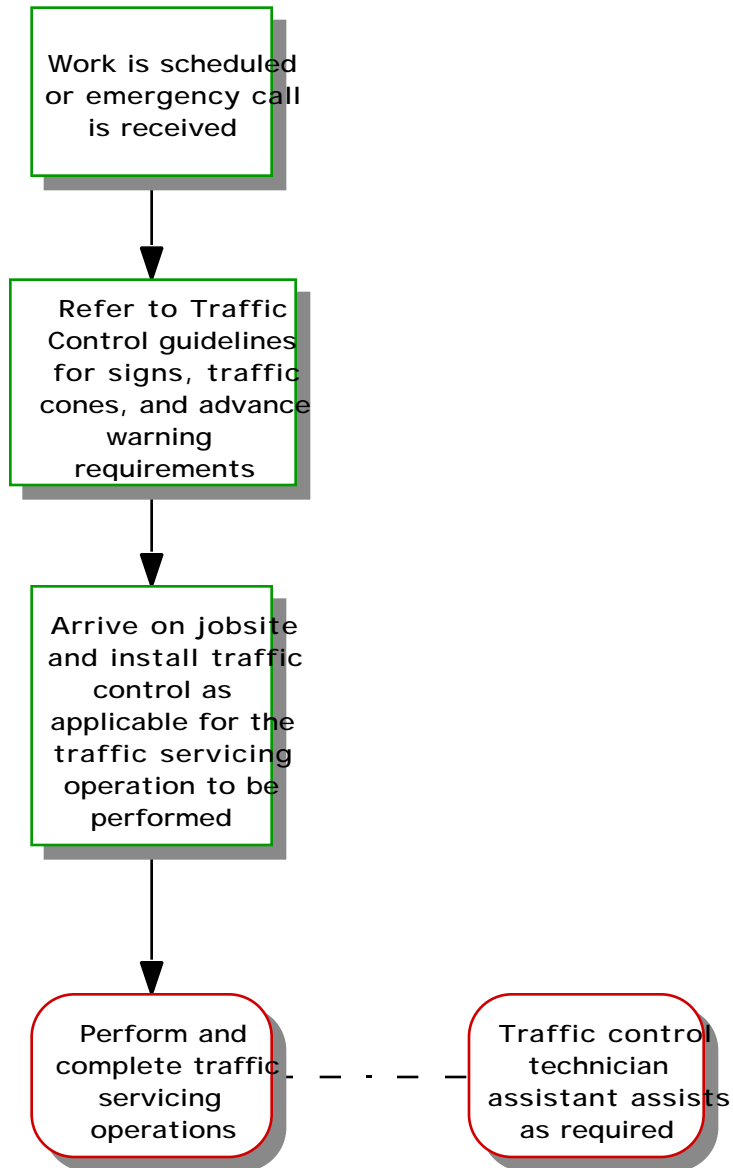
Employees will report suspected hazards to their immediate supervisor and are required to follow instructions by the trained responsible party in all matters of work with or near aerial truck devices.

6.3.6 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to manager/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Aerial Truck Operations Flowchart



Back Protection**SPP# 1910.001****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures for implementing the North Carolina Department of Transportation (NCDOT) Back Protection Program.

2.0 Scope and Applicability

Back injuries represent the most common type of workers' compensation claim in NCDOT. Jobs within NCDOT with high rates of back injuries tend to be those requiring a great amount of manual load handling. Eliminating and/or minimizing back injuries can result in lower workers' compensation costs and promote the well-being of employees.

This safety policy and procedure emphasizes the program management aspects of NCDOT's Back Protection Program. NCDOT's **Back at Work** Program, designed to emphasize proper lifting techniques, is a component of NCDOT's Back Protection Program.

This safety policy and procedure provides guidelines to implement an effective Back Protection Program in the workplace. It includes provisions for employee lifting training entitled, **Back at Work**, and discussion on work related risk factors for back pain. Additionally, to assist managers/unit heads, techniques are presented in

SAFETY POLICY & PROCEDURE

identifying jobs with those risk factors and tools are provided to help analyze lifting tasks.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any NCDOT employee who as a result of his or her job duties performs manual lifting.

3.0 Reference

This safety policy and procedure is established in accordance with NCDOT's ***Back to Work*** Program as well as with recognized general industry safe work practices that have effectively minimized back injuries.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT management will administer a back protection program and at risk employees will receive the required training. When lifting hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and additional training regarding Back Protection will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Back Protection. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT.

6.1 Definitions

Behavior Modification

Changing an employee's action or motions from a negative, accident/injury prone behavior to a positive, safe action or motion.

Mechanical Equipment

Any device designed to aid in moving material including cranes, hand trucks, pallet jacks, forklifts, etc.

Lifting Belt

A support designed for the lumbar area of the lower back to provide additional support when lifting.

Risk Factors

Exposures and personal characteristics that affect an individual's chances of experiencing pain associated with lifting related injuries to the back.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Risk Factors
- Identifying Jobs with Risk Factors
- Minimizing Lifting Related Back Injuries

6.2.1 Training

NCDOT employees who perform manual lifting shall attend ***Back at Work*** training on proper lifting techniques.

Back belts are not to be used or assigned to employees until they complete the ***Back at Work*** training. Figure 1 presents how a lifting belt is typically worn.

Training shall be provided upon initial employment and/or new job assignment. Periodic refresher training shall be conducted at the discretion of the supervisor.

Training will include, but is not limited to, proper lifting techniques, proper use of the back belt, injury prevention, and behavior modification.



Figure 1

6.2.2 Risk Factors

There are major differences in the ability of individuals to withstand lifting and other demanding physical labor. Because back pain results from different circumstances, an individual's exposure and personal characteristics affect his or her chances of experiencing lifting related back injuries. Work related risk factors have been identified from various studies and include:

- Heavy lifting and heavy work
- Frequent lifting
- Lifting loads near one's strength capacity
- Occasional very stressful load handling
- Sudden unforeseen events (accidents)
- Prolonged standing or sitting
- Other suspected risk factors, including whole body vibration, pushing, pulling, carrying, twisting, and bending
- Employee's physical condition

Other personal factors that make certain individuals more susceptible to back injury are not included in the above list. Those jobs and tasks that have several or many of the above risk factors should receive a higher priority in assessing your operation's back injury risks.

6.2.3 Identifying Jobs with Risk Factors

Focusing on the more significant problem areas of back injury potential is the most cost-effective approach in examining the jobs and tasks in your operation. A two-stage prioritizing scheme is recommended when examining your manual lifting operations. First, identify those jobs that involve many of the risk factors. Second, for those identified jobs, specific lifting tasks should be singled out for further analysis.

Appendix A presents forms to identify jobs and specific lifting tasks at higher risk levels of lifting related back injuries. Once these specific lifting tasks are identified, Appendix B should be used to quantitatively assess those lifting tasks.

6.2.4 Minimizing Lifting Related Back Injuries

Once specific lifting tasks are identified and assessed, if required, examine options to eliminate or minimize those lifting related back injuries. Look at:

- Elimination of the lifting
- Substitution of the nature of task, if elimination is not possible
- Control stress level imposed on the back when lifting if the two previous approaches do not work

SAFETY POLICY & PROCEDURE

Appendix C presents a checklist to assist the user in exploring ways to eliminate, substitute, or control the lifting tasks that could cause back injuries.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of equipment and supplies to aid in minimizing lifting related back injuries. They will also be responsible for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance through their auditing process.

6.3.2 Supervisors

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are properly trained before using lifting belts and that they are being worn properly. Supervisors will ensure that no employee is required to lift beyond his or her capabilities. Upon request, employees are to receive assistance in lifting.

6.3.3 Employees

Employees are to report any unsafe act associated with this policy to their supervisors. Employees are to report any injury to their immediate supervisors.

Employees that are assigned lifting belts are to maintain them and have them replaced when torn or frayed. Employees must attend NCDOT's **Back at Work** program before being authorized to use lifting belts.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training and will provide **Back at Work** training at the request of managers/unit heads.

Safety and Loss Control will also work with Purchasing and the Central Equipment Unit to ensure that all newly purchased lifting related equipment and supplies comply with current safety regulations.

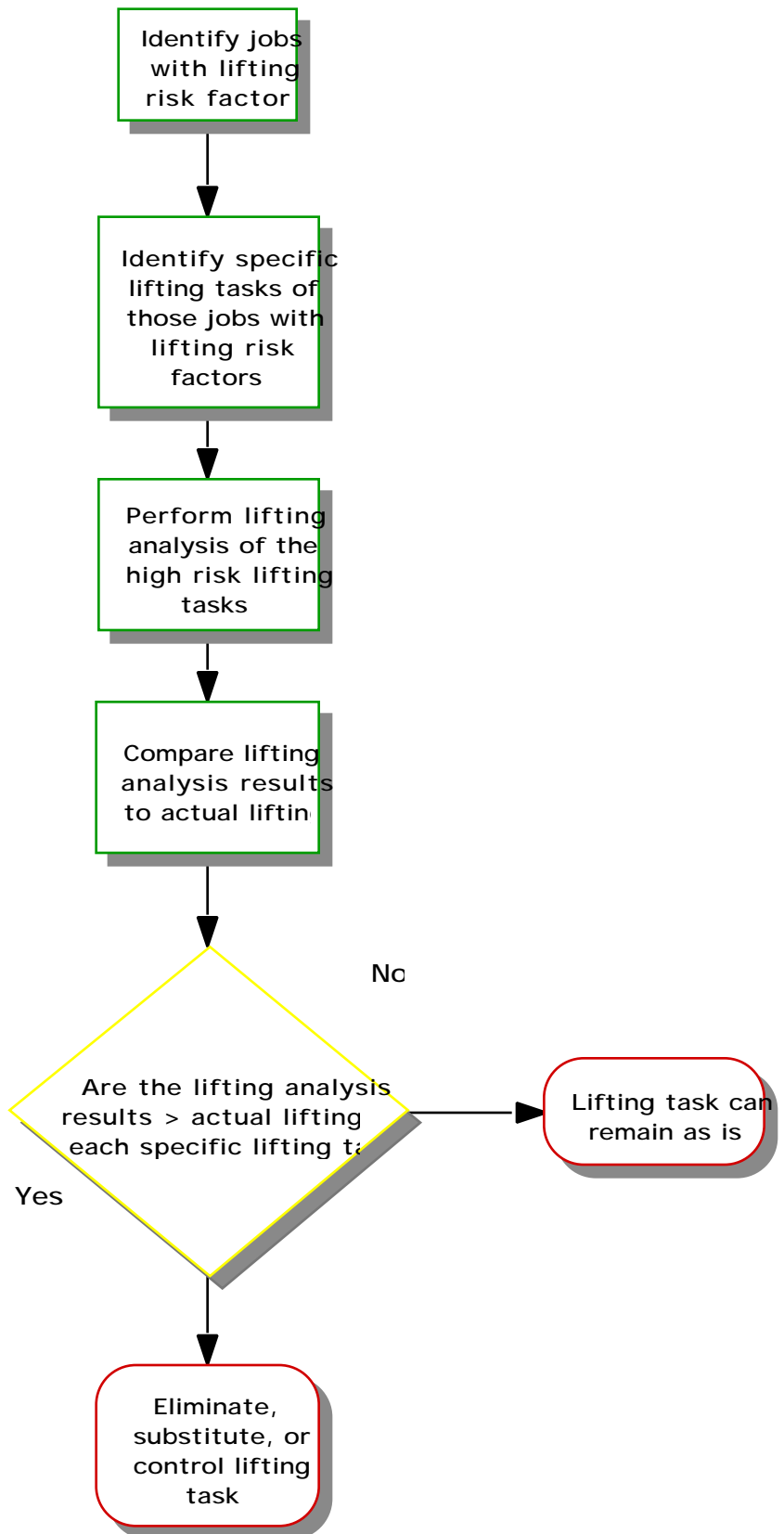
SAFETY POLICY & PROCEDURE

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will support Division/Units with the selection and purchase of lifting equipment and supplies.

Back Protection Flow chart



SAFETY POLICY & PROCEDURE

APPENDIX A: Back Injury Risk Factor Assessment

Facility/Jobsite: _____ Location: _____
Person Performing Assessment _____ Date: _____

Instructions

The following sequence is recommended to perform the Back Injury Risk Factor Assessment:

- Identify and list all the jobs in your facility or operation with frequent reports of back injuries (examine accident/injury data as needed).
- Indicate the risk factors that are present for each of those previously identified and listed jobs.
- Note the jobs that require frequent lifting and occasional very stressful lifting. Jobs with frequent lifting and occasional very stressful lifting should be ranked high.
- Make comparative assessments as to which jobs are the most physically stressful to the least physically stressful. (Obtain input as needed from employees experienced in performing several of the jobs.)
- Note the jobs which are the most physically stressful for further examination.
- List the lifting tasks for the highest priority jobs.
- Rank each lifting task, with input from employees, against each other in how stressful the task is to their backs. For example, if there are three lifting tasks, rank them as the most stressful, second most stressful, and least stressful.

Job	Heavy Lifting and Heavy Work	Frequent Lifting	Lifting Loads Near One's Strength Capacity	Occasional Very Stressful Load Handling	Sudden Unforeseen Events (Accidents)	Prolonged Standing or Sitting	Other Risk Factors

*Includes whole body vibration, pushing, pulling, carrying, twisting, and bending
A check mark indicates a confirmatory condition.

SAFETY POLICY & PROCEDURE

APPENDIX A: Back Injury Risk Factor Assessment (Continued) 2

Job: _____

Lifting Tasks Associated with Job	Stress Rank
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Job: _____

Lifting Tasks Associated with Job	Stress Rank
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Job: _____

Lifting Tasks Associated with Job	Stress Rank
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Once the lifting tasks are identified, perform a lifting task analysis as listed in Appendix B for each task.

APPENDIX B: Lifting Task Analysis

General

The lifting tasks that were identified as being the most stressful from the back injury risk factor assessment in Appendix A probably are exceeding the safe lifting weight for that particular situation. The most stressful lifting tasks should be evaluated to determine if the recommended weight for that particular lifting situation is being exceeded.

Lifting Analysis

A lifting task is considered to be the act of manually grasping and raising an object of definable size without mechanical aids.

The National Institute of Occupational Health (NIOSH) developed a lifting equation which quantifies the variables involved in lifting. This equation is:

$$AL = 90 (6/H) (1-0.01|V-30|) (0.7+3/D) (1-F/F_{\max})$$

Where:

- AL = Action level, in lbs, that over 75 percent of women and 99 percent of men can safely lift
- H = Horizontal location forward of the ankles at origin of lift (inches)
- V = Vertical location at origin of lift (inches)
- D = Vertical travel distance, either up or down, between origin and destination of lift
- F = Average frequency of lifts (lifts/minute)
- F_{max} = Maximum frequency which can be sustained (See Table B-1)

These variables are assumed to have the following limits:

- H is between 6 inches and 32 inches.
- V is assumed between 0 inch and 70 inches representing the range of vertical reach for most people.
- D is assumed between 10 inches and (80-V) inches. For travel less than 10 inches, set D = 10.
- F is assumed between 0.2 (one lift every five minutes) and F_{max} (see Table B-1). For lifting less frequently than once per five minutes, set F = 0.

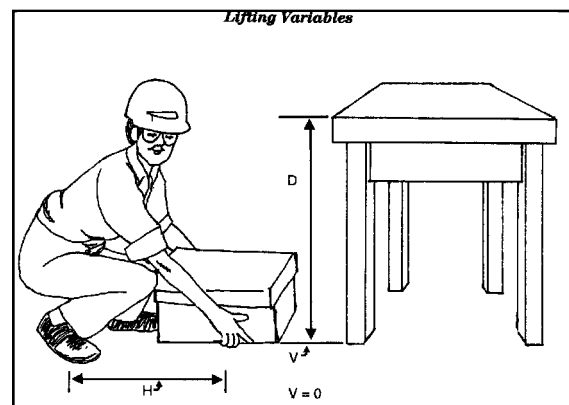


Figure 2

Figure 2 illustrates these lifting variables.

SAFETY POLICY & PROCEDURE

APPENDIX B: Lifting Task Analysis (Continued) 2

Table B-1 presents the maximum frequency (F_{\max}) which can be sustained for either a standing or stooped position for a 1 hour (occasional) or 8 hour (continuous) period. Select the appropriate F_{\max} value for the particular lifting task being analyzed.

Table B-1: F_{\max} Table (lifts/minute)

Period	Average Vertical Location (inches)	
	$V > 30$ Standing	$V \leq 30$ Stooped
1 hour	18	15
8 hours	15	12

Example: Given a continuous stooped lifting situation for an 8 hour period with:

$H = 8$ inches

$V = 16$ inches

$D = 40$ inches (average distance)

$F = 6$ lifts/minute

$F_{\max} = 12$; From 8 hours for $V \leq 30$ in a stooped position

Then:

$$\begin{aligned} AL &= 90 (6/8) (1 - 0.01|16 - 30|) (0.7 + 3/40) (1 - 6/12) \\ &= 90 (0.75) (0.86) (0.78) (0.5) = 22.5 \text{ lbs} \end{aligned}$$

Comparison of Lifting Analysis to Actual Lifting

If the actual weight for the lifting task exceeds the calculated action level for that task, then that lifting task either needs to be eliminated, substituted, or controlled.

See Appendix C for additional guidance for addressing these circumstances.

SAFETY POLICY & PROCEDURE

APPENDIX C: Lifting Task Redesign Checklist

Lifting Task: _____

Yes No *Elimination Questions*

- | | | | |
|--------------------------|--------------------------|---|--|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Is there really a need for the lifting task? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Can the need for lifting the load be eliminated? |

Substitution Questions

- | | | | |
|--------------------------|--------------------------|---|---|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could lifting equipment be used instead of the worker's arm and back muscles? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could the weight of the load be reduced? |

Control Questions

- | | | | |
|--------------------------|--------------------------|---|--|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could the load be packaged differently so that the natural way to grasp it would place it closer to the body? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could the load be stored differently to reduce the horizontal distance from the body at both pickup and set down points? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could the load be packaged differently so that the vertical distance above the floor during both pickup and set down is above knee height and below shoulder height? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could the load be stored differently so that the vertical distance above the floor during both pickup and set down is above knee height and below shoulder height? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could the vertical distance between the pickup point and set down point be reduced? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could the frequency rate of lifting be reduced? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could the duration of a lifting session be shortened? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could handles or another type of grasping point be made available to improve comfort and control during the lift? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could the need to rotate from left to right, or right to left, be reduced? |

Housekeeping at Construction Sites

SPP# 1926.25

Quick Reference

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3.0 Reference	1
4.0 Policy	2
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6.0 Procedure	2
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6.2.1 Training	3
6.2.2 Construction Scrap and Debris	3
6.2.3 Construction Waste Disposal	3
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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the protection and safety of North Carolina Department of Transportation (NCDOT) employees at construction sites.

2.0 Scope and Applicability

NCDOT construction sites can present many hazards to employees when they are performing construction-related activities. Keeping a construction site relatively clean of debris can further reduce hazards. The benefits of good housekeeping far exceeds the small additional effort required to establish good housekeeping practices at a construction site.

This safety policy and procedure provides information on activities to implement a housekeeping program at a construction site. It also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT. This document affects all NCDOT employees at NCDOT construction sites.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.25).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death and serious physical harm to employees or the public. Therefore, all employees on NCDOT construction sites will practice good housekeeping to further reduce hazards to employees. When construction hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Housekeeping will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Housekeeping. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Housekeeping.

6.1 Definitions

Debris

Unusable or unwanted construction waste material.

Form Lumber

Lumber that is used to contain liquid concrete into defined shapes until the concrete hardens.

Hazardous Waste

Waste that is either toxic to humans or to the environment.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

SAFETY POLICY & PROCEDURE

- Training
- Construction Scrap and Debris
- Construction Waste Disposal

6.2.1 Training

Employees will be trained to work safely on construction sites by following good housekeeping practices. Employees will be trained in:

- The importance of housekeeping
- The benefits of housekeeping

Employees will be trained at time of initial employment or assignment.

6.2.2 Construction Scrap and Debris

Scrap material and debris generated during construction usually consist of:

- Non-combustible scrap material and debris
- Combustible scrap material and debris

Non-combustible scrap material and debris that consist of form and scrap lumber with protruding nails, and all other debris, must be kept cleared from work areas, passageways, and stairs, and from around buildings or other structures.

Nails should be removed from used lumber before stacking. Combustible scrap and debris must be removed at regular intervals during the course of construction without increasing the hazard exposure to employees who remove such debris. See [SPP# 1910.141, Sanitation](#), for related information on construction sites.

6.2.3 Construction Waste Disposal

All construction waste must first be collected into containers before disposal. The categories of construction waste generated at a construction site include:

- General waste and trash (non-toxic, non-hazardous)
- Hazardous waste

Separate containers must be provided for the collection and separation of waste, trash, and other refuse.

Additional separate containers must be provided with lids for hazardous wastes to prevent sparks or other ignition sources from coming into contact with hazardous waste. Hazardous wastes can include used oil, used oil filters, oily rags and flammable wastes as well as caustics, acids, harmful dusts, etc.

SAFETY POLICY & PROCEDURE

Absorbent that is used to collect incidental used oil spills and oily rags can be disposed of in waste collection dumpsters. Used oil filters must be drained of oil before they can be disposed into separate waste containers.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of containers and other related supplies to maintain effective housekeeping practices at construction sites. Managers/Unit Heads will obtain and coordinate the required training for employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that employees are instructed on good housekeeping practices when performing their job duties.

6.3.3 Employees

Employees are responsible for following good housekeeping practices in the performance of their job duties.

Employees shall report any hazardous conditions to their immediate supervisor.

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

SAFETY POLICY & PROCEDURE

APPENDIX A: Construction Housekeeping Checklist

Construction Site:_____

Location:_____

Division/Unit:_____

Date:_____

Yes

No

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Are protruding nails, form and scrap lumber, and other debris kept clear from work areas, passageways, and stairs, in and around buildings or other structures? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are combustible scrap and debris being removed at regular intervals during the course of construction? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are containers being provided for the collection and separation of waste and trash? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do the containers for the hazardous wastes (oily rags and flammable wastes such as caustics, acids, harmful dusts, etc.) have lids? |

Right of Inspection**SPP# 1926.03****Quick Reference**

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2.0 Scope and Applicability.....	1
3.0 References	2
4.0 Policy	2
5.0 General Responsibilities	2
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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for North Carolina Department of Transportation (NCDOT) employees to cooperate effectively with Occupational Safety and Health Administration (OSHA) compliance inspections and to ensure that OSHA compliance inspections are conducted in a professional and structured manner.

2.0 Scope and Applicability

The North Carolina Department of Labor, Division of Occupational Safety and Health, is designated to administer and enforce OSHA within both the private and public sectors in North Carolina. The enforcement of OSHA is accomplished in part by worksite inspections conducted by compliance officers.

This safety policy and procedure provides guidelines to be followed when an OSHA inspection occurs. It includes provisions for informing employees about typical OSHA inspections and discussion on the particular components of an OSHA inspection.

SAFETY POLICY & PROCEDURE

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects every NCDOT employee.

3.0 Reference

This safety policy and procedure is established in accordance the Occupational Safety and Health Act of 1970 which authorizes OSHA to conduct workplace inspections.

4.0 Policy

It is the policy of NCDOT to provide the right of entry to any regulatory agency official or its representative to any worksite or facility owned or operated by NCDOT upon presentation of appropriate credentials.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on OSHA Inspections. It is also the responsibility of each NCDOT employee to report immediately any OSHA inspection activity to his or her supervisor.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on OSHA Inspections.

6.1 Definitions

Compliance Officer

A representative of OSHA who has been trained and has been authorized to conduct workplace safety inspections.

OSHA

Occupational Safety and Health Act. In North Carolina the OSHA Act is administered by the North Carolina Department of Labor (NCDOL).

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

SAFETY POLICY & PROCEDURE

- Training
- Validating OSHA Officers' Credentials
- NCDOT Notification Process
- Opening Conference
- OSHA Inspection Process
- Closing Conference

6.2.1 Training

No formal training is to be provided to employees. However, employees should be informed about the typical inspection process that may be performed by North Carolina Occupational Safety and Health Administration (NCOSHA). This information should be provided upon initial employment or on a one time basis and should contain:

- How a typical OSHA compliance inspection is conducted
- Employees' responsibilities when an OSHA compliance officer arrives on a jobsite

6.2.2 Validating OSHA Officers' Credentials

OSHA compliance officers should present their credentials once they arrive on-site for an inspection. Employees should ask to see their ID if it is not presented. As needed, NCDOL can be called to verify the identity of the compliance officer.

6.2.3 NCDOT Notification Process

NCDOT management, your Safety Engineer, and Safety and Loss Control's office should be contacted immediately in the event of an OSHA inspection. All employees should inform the compliance officer that they are required to notify their supervisor and NCDOT's safety personnel. All employees should make every effort to contact their supervisor and NCDOT's safety personnel so they can assist with the inspection.

6.2.4 Opening Conference

The OSHA compliance officer will conduct an initial meeting in which he or she will explain how the site was selected, the purpose of the visit, the scope of the inspection, and the standards that apply.

NCDOT will be asked to select a representative(s) to accompany the officer during the inspection. This representative(s) should be NCDOT managers/unit heads or supervisors and a Safety and Loss Control representative, if possible.

SAFETY POLICY & PROCEDURE

6.2.5 OSHA Inspection Process

The inspection process typically begins with a walk-through of the worksite or facility. The compliance officer will take statements, photographs, videos, and measurements and talk with employees. The compliance officer will examine safety and health conditions and practices, examine records, collect air samples, measure noise levels, and monitor employee exposure to toxic fumes, gases, and dusts.

The compliance officer will interview employees and take statements from selected individuals. By regulatory mandate, NCOSHA can conduct private interviews without management's presence.

All employees should truthfully respond to all questions from the compliance officer. If a response is not known to a particular question, employees should simply state, "I do not know. You will need to speak with my supervisor."

If possible, NCDOT should take the same photographs and videos of the same items as the compliance officer. This will allow NCDOT to document the conditions at the time of the inspection.

6.2.6 Closing Conference

At the conclusion of the inspection, the compliance officer will conduct a closing conference. The compliance officer will discuss all unsafe or unhealthful conditions observed during the inspection and will indicate all apparent violations for which a citation and a penalty may be issued or recommended. The compliance officer will apprise NCDOT of its rights under the OSHA Act.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available for the purchase of proper equipment and training for compliance with applicable safety policy and procedures. Managers/Unit Heads will ensure they maintain on-site Workplace Safety and Safety Policy and Procedure Manuals. Compliance with applicable standard operating procedures and safety policy and procedures will help ensure compliance with applicable OSHA regulations.

SAFETY POLICY & PROCEDURE

Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure compliance with all applicable safety policy and procedures through their auditing process.

Managers/Unit Heads will contact Safety and Loss Control or their assigned Safety Engineer as soon as possible when OSHA compliance officers arrive on-site.

6.3.2 Supervisors

Supervisors are responsible for ensuring that employees follow approved work practices.

Supervisors are required to inform their managers/unit heads as soon as possible when OSHA compliance officers arrive on their worksite.

6.3.3 Employees

Employees are responsible for informing their supervisors when OSHA compliance officers arrive on-site.

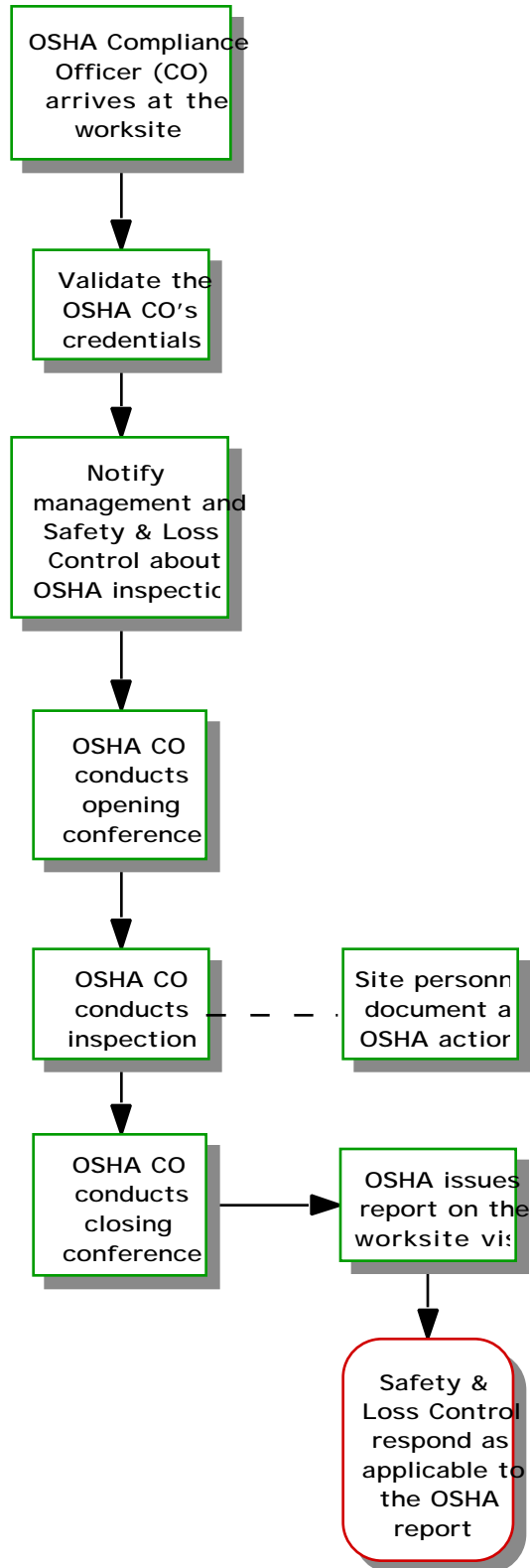
Employees should truthfully respond to all questions posed by the compliance officer.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary when notified of an OSHA compliance inspection or on any matter concerning an OSHA inspection. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will take a lead role in assessing any outcome of an OSHA inspection and in determining the appropriate followup action to an OSHA inspection.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Right of Inspection Flowchart



SAFETY POLICY & PROCEDURE

APPENDIX A: NCDOT OSHA Inspection Checklist Form

YES

NO

☐☐

Did the OSHA Compliance Officer show identification?

General

OSHA Compliance Officer's Name _____

Date of Inspection _____

Location of Inspection _____

Time Inspection Began _____

Time Inspection Ended _____

What safety and health conditions and practices were examined? _____

What records were examined? _____

Air Samples

YES

NO

☐☐

Were any air samples taken? If yes, indicate below

Air Sample Log					
Air Sample #	Date	Time	Type of Sample	Location	Work Conditions

SAFETY POLICY & PROCEDURE

APPENDIX A: NCDOT OSHA Inspection Checklist Form (Continued) 2

Noise Measurements

YES

NO

☐☐

Were any noise measurements taken? If yes, indicate below.

Noise Measurements Log						
Noise Sample #	Date	Time	Type of Instrument Used	Location	Work Conditions	dB Reading

Exposure Measurements

YES

NO

☐☐

Were any other exposure measurements taken? If so, describe.

Exposure Measurements Log							
Contaminant	Sample ID	Date	Start Time	End Time	Media Measurement Instrument	Location	Work Conditions

SAFETY POLICY & PROCEDURE

APPENDIX A: NCDOT OSHA Inspection Checklist Form (Continued) 3

Personnel Interviewed by OSHA

Name

Job Location

Job Title

Photo Log

Photo Log				
Photo #	Date	Time	Subject	Location

Video Log (Turn on Video Camera Frame Synchronizer)

Video Log						
Start Time Frame #	End Time Frame #	Date	Start Time	End Time	Subject	Location

Safety Assessment of Leased Property**SPP# A-3****Quick Reference**

1.0 Purpose	1
2.0 Scope and Applicability.....	1
3.0 Reference	1
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APPENDIX A: Leased Property Fire and Life Safety Checklist	5

1.0 Purpose

The purpose of this safety policy and procedure is to provide guidelines and checklists for the evaluation of leased property within North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Currently leased facilities and proposed leased space must be evaluated for fire protection and life safety. These evaluations are part of the leasing procedures coordinated by the State Property Office.

This safety policy and procedure provides guidelines and a checklist to assist NCDOT safety personnel in leased property assessments.

This document applies to those employees who perform leased property assessments for NCDOT.

3.0 Reference

This safety policy and procedure is established in accordance with State Property Office and Department of Insurance guidelines.

SAFETY POLICY & PROCEDURE

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all NCDOT leased properties will be assessed for life and fire safety.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Safety Assessment of Leased Property. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Safety Assessment of Leased Property.

6.1 Definitions

Leased Property

Property that is rented from another property owner and used for NCDOT purposes.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Leasing Authority
- Fire and Safety Checklist

6.2.1 Leasing Authority

The State Property Office delegates leasing authority to NCDOT in a two-tier system. This two-tiered system is:

- Property leases with annual rental not exceeding \$5,000
- Property leases with annual rental between \$5,000 and \$12,000 and lease term not exceeding 3 years

SAFETY POLICY & PROCEDURE

NCDOT executes property leases with annual rental not exceeding \$5,000. NCDOT also executes leases for properties with annual rental between \$5,000 and \$12,000 and lease terms not exceeding 3 years by submitting a proposal to lease form to the State Property Office.

The State Property office executes those leases with annual rentals exceeding \$12,000 and/or terms exceeding 3 years.

6.2.2 Fire and Safety Checklist

Appendix A presents a fire and safety checklist developed by the Department of Insurance which is to be used in leased facilities evaluations. This checklist can be used to:

- Evaluate existing fire and safety conditions on leased properties (existing and proposed)
- Evaluate and compare competitive proposals for leased spaces

This checklist is to be used by NCDOT safety personnel (Division Safety Officers and Safety and Loss Control Safety Engineers) to evaluate existing and proposed leased spaces under NCDOT's leasing authority.

This checklist should be completed far enough in advance of the lease renewal or potential new lease to permit effective negotiations for building safety improvements. This list is not all-inclusive and a building which looks good may still have conditions detrimental to life safety or loss prevention.

For existing or proposed leases with annual rentals between \$5,000 and \$12,000 and the lease term not exceeding 3 years, a "*Proposal to Lease*" (State Property Office Form PO-28) must be attached. The Department of Insurance inspects proposed or existing leased locations that exceed \$12,000 in annual rental or the lease term exceeds three years.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for identifying the leased buildings and/or facilities in their organizations. They will also identify which of these buildings and/or facilities are under NCDOT's direct leasing authority and which ones are not. They will coordinate and obtain fire and safety inspections as required by this safety policy and procedure.

Managers/Unit Heads are also responsible for communicating building and/or facility life and fire safety deficiencies to the State Property Office and the building owner.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

SAFETY POLICY & PROCEDURE

6.3.2 Supervisors

Supervisors will assist as requested in the life and fire safety inspections of buildings and/or facilities. They will also note any life and fire safety deficiencies during their facility and jobsite audits.

6.3.3 Employees

Employees shall report any life and fire safety deficiencies in buildings and/or facilities to their immediate supervisor.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure.

Safety and Loss Control Safety Engineers will perform life and fire safety assessments of buildings and/or facilities and provide technical guidance to other safety personnel performing such inspections.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

SAFETY POLICY & PROCEDURE

APPENDIX A: Leased Property Fire and Life Safety Checklist

DATE: _____

EVALUATION BY: _____
MAIL ADDRESS: _____
TELEPHONE#/FAX#: _____
BUILDING CHECKED: _____
STREET ADDRESS: _____
CITY, STATE, ZIP: _____
OWNER'S REP: _____
TELEPHONE#/FAX #: _____

TYPE OF LEASE: ☐ RENEWAL ☐ PROPOSED

RESULTS and COMMENTS: _____

YES	NO	<u>EXITS, EXIT ACCESS, AND SEPARATION</u>
<input type="checkbox"/>	<input type="checkbox"/>	1. Does building have at least two remote exits? If NO, answer Item (2). If YES, skip to Item (3).
<input type="checkbox"/>	<input type="checkbox"/>	2. Answer (2) ONLY if Item (1) was NO: Does building contain less than 3500 square feet per floor, not exceed two stories, have not over 40 occupants, and travel distance to proper exit not exceed 75 feet? If NO, see Note (A).
<input type="checkbox"/>	<input type="checkbox"/>	3. Is travel distance to exit or to an enclosed exit stair less than 200 feet (250 feet if sprinklered) and any dead end in exit access corridors less than 20 feet (50 feet if pre-1991 building)? If NO, a Code deficiency exists.

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APPENDIX A: Leased Property Fire and Life Safety Checklist (Continued) 2

YES	NO	<u>EXITS, EXIT ACCESS, AND SEPARATION</u>
<input type="checkbox"/>	<input type="checkbox"/>	4. Are all the exit stairs fully enclosed with at least one-hour fire rated construction, with “B”-labeled doors having closers and latching hardware? (The label is found on door edge, hinge side or top.) If NO, a Code deficiency exists.
<input type="checkbox"/>	<input type="checkbox"/>	5. Are all vision panels in stair doors wired glass in steel frames, not exceeding 100 square inches? If NO, a Code deficiency exists.
<input type="checkbox"/>	<input type="checkbox"/>	6. Do all exit stairs terminate outside the building, with direct access to a public space, and do not require re-entering the building? If NO, answer Item (7). If YES, skip to Item (8).
<input type="checkbox"/>	<input type="checkbox"/>	7. Answer (7) ONLY if Item (6) was NO: If upstairs occupants must re-enter the building at the exit level, is this area or vestibule separated from the remainder of the exit level floor by at least one-hour fire rated construction? If NO, see Note (A).
<input type="checkbox"/>	<input type="checkbox"/>	8. Are tenant spaces separated by one-hour fire rated construction? (This typically means at least gypsum board walls on steel studs.) If NO, answer (9). If YES, skip to (10).
<input type="checkbox"/>	<input type="checkbox"/>	9. Answer (9) ONLY if Item (8) was NO: Are the combined areas of multiple tenant spaces divided by walls of at least one-hour fire rated construction into spaces not exceeding 3000 square feet? If NO, a Code deficiency exists.
<input type="checkbox"/>	<input type="checkbox"/>	10. Is a copy of the Emergency Evacuation and Fire Prevention Plan required under SPP # 1910.38 on hand? Are all elements completed and up to date?

NOTE (A): The exit system may be deficient. The building will have to be evaluated by a building code professional.

Occupational Safety Training**SPP# 1926.21****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the North Carolina Department of Transportation (NCDOT) employees to receive occupational safety training related to their assigned jobs.

2.0 Scope and Applicability

A direct relationship exists between the increase in accidents and/or severity of injuries and illnesses and a lack of attention to appropriate safety training. It can be shown through injury/illness statistics, medical and Workers' Compensation costs, and the intangibles of morale and human suffering that NCDOT must make training a vital element in its safety program.

Therefore, this safety policy and procedure provides guidelines to ensure NCDOT employees receive the appropriate safety and health training applicable to their jobs.

This document lists the applicable OSHA regulations for NCDOT operations, presents the safety training matrix, and provides discussion on methodologies for

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estimating implementation resources. It outlines the minimum components of NCDOT's training program, provides training guidelines, and discusses the importance of matching training to employees. This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and the Division Safety Officer.

This safety policy and procedure affects all NCDOT employees.

Specific applicability to a training requirement will be determined by:

- Job classification
- Incidents of accidents and injuries
- Use of hazardous substances
- New job assignments

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Act of 1970, the Occupational Safety and Health Standards for General Industry (29 CFR 1910), the Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926) and other applicable standards referenced in this safety policy and procedure manual.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT will make training a primary element of its workplace safety program. No employee will be allowed to perform any job related task until the individual has been properly instructed and trained in the safe and proper methods of performing the task. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and additional specialized training will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure NCDOT's safety policy and procedure on Occupational Safety Training is implemented in accordance with this safety policy and procedure. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Occupational Safety Training.

6.1 Definitions

Certified Internal Trainer (CIN)

A NCDOT employee/trainer who has been certified by Safety and Loss Control to teach a specific training course.

Community College (CC)

An educational institution that offers safety training courses and instruction.

Hazard Assessment

The process of reviewing job tasks prior to the operation and identifying any hazards associated with each particular tasks.

Hazard Recognition

Remembrance of the hazards identified in the assessment phase that are associated with a particular job task or operation.

Instructor Outline

A standardized outline, developed using the Instructional Systems Development model, for use by instructors who provide safety training. The outline includes information to be shared with the class as well as prompts for the instructor on when to use various audio-visual aids and other training activities.

Instructional Systems Development (ISD)

An international model used by corporate, government and military trainers to provide a systematic and consistent method of identifying and developing training solutions.

Internal Training (IN)

Safety training conducted by NCDOT employees/trainers.

Job Instructional Training (JIT)

On the job training that uses an informal method of training to instruct individuals on the procedures to follow for a particular operation, task, or procedure. JIT is primarily task related and usually involves one-on-one hands on training.

Lesson Plan

An organized plan containing information relevant to a course. Lesson plans include the purpose of the course, participant objectives, instructional method, the course length, references and other information used by the instructor to provide the appropriate instruction.

Participant Outline

A standardized outline for use by the attendees during safety training.

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Safety Training Video

A commercially purchased, or in-house produced, standard VHS video that contains relevant safety training material.

Third Party

An outside provider of safety training to NCDOT employees.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- OSHA Training Requirements Applicable to NCDOT Operations
- Safety Training Matrix
- Estimating Resources to Implement a Safety Requirement
- Training Guidelines
- Minimum Components of Training
- Matching Training to Employees

The general elements of this program are found in the Occupational Safety and Health Act of North Carolina. More than 100 of the current standards contain training requirements. However, the goal of NCDOT is to provide all necessary safety training to employees whether it is OSHA mandatory or non-mandatory safety related training.

6.2.1 OSHA Training Requirements Applicable to NCDOT

NCDOT will instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his or her work environment to control or eliminate any hazards or other exposure to illness or injury.

The following OSHA training requirements, as contained in the following General Industry (29 CFR Part 1910) and Construction (29 CFR Part 1926) Standards, are applicable to NCDOT operations:

- Arc Welding Equipment (1910.254 and 1926.351)
- Asbestos (1910.1001)
- Compressed Air (1926.803)
- Cranes and Derricks (1926.550)
- Cranes, Crawler Crane, Equipment Operators, Locomotive Crane, Wheel Mounted Crane (1910.180)
- Diving Operations (1910.410)
- Electrical Safety Related Work Practices (1910.331-335 and 1926.416-418)
- Employee Emergency Plans (1910.38)
- Excavation, Trenching, and Shoring (1926.650)

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- Explosives and Blasting Agents (1910.109 and 1926.900)
- Fire Detection Systems (1910.164)
- Fire Prevention and Protection for Welding, Cutting, and Brazing (1910.252 and 1926.352)
- Fire Prevention Plans (1910.38)
- Fixed Extinguishing System (1910.160)
- Flammable and Combustible Liquids (1910.106)
- Forklifts, Tractors, and Other Powered Industrial Trucks (1910.178 and 1916.602)
- Ground Fault Protection (1926.404)
- Ionizing Radiation (1910.96 and 1926.53)
- Lead in Construction (1926.62)
- Lockout/Tagout (1910.147)
- Machine Guarding for Mechanical Power Presses (1910.217)
- Machine Guarding for Woodworking Machinery (1910.213 and 1926.304)
- Medical and First Aid (1910.151 and 1926.50)
- Nonionizing Radiation (1926.54)
- Occupational Noise Exposure (1910.95)
- Overhead and Gantry Cranes (1910.179)
- Oxygen-Fuel Gas Welding and Cutting (1910.253 and 1926.350)
- Personal Protective Equipment (1910.135-138)
- Portable Fire Extinguishers (1910.157 and 1926.150)
- Power Operated Hand Tools (1926.302)
- Powered Platforms, Manlifts, and Vehicle Mounted Work Platforms Operations (1910.66)
- Resistance Welding (1910.255)
- Respiratory Protection (1910.134 and 1926.103)
- Roll-Over Protective Structures for Tractors Used in Agricultural Operations (1928.51)
- Safety Training and Education (1926.21)
- Scaffolding (1926.451)
- Servicing of Single Piece and Multi-Piece Rim Wheels (1910.177)
- Signaling (1926.201)
- Spill Response (1910.120)
- Stairways and Ladders (1910.25 - 27 and 1926.1060)
- Underground Construction (1926.800)
- Ventilation (1910.94)
- Woodworking Tools (1926.304)

Additional safety related training that is necessary but not currently listed in the OSHA regulations include:

- Back Belt Training
- Ergonomics

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- Fleet Safety
- New Employee Safety Orientation
- OSHA Inspection Training for Supervisor
- Safety Related Legal Issues for Managers
- Supervisor Safety Responsibilities
- Violence in the Workplace
- Workers' Compensation for Supervisors
- Workzone Safety

This safety policy and procedure manual consolidates many of the previously listed standards and related safety training into single safety policies and procedures. Refer to the indices contained in the back of this manual for a complete cross reference of the safety policies and procedures to the applicable OSHA standards.

6.2.2 Safety Training Matrix

Appendix A presents NCDOT's Safety Training matrix which outlines:

- The course name
- Applicable Safety Policy and Procedure
- Training frequency
- Affected employees
- Length of initial training
- Length of renewal training
- Minimum resources required for training
- Training method
- List of reference materials and sources

NCDOT's safety training matrix reflects all the applicable training requirements reflected in this Safety Policy and Procedure Manual. See the applicable safety policy and procedure for further details for a specific training requirement.

6.2.3 Estimating Resources to Implement a Safety Requirement

NCDOT managers can estimate total resources required for a particular safety requirement by evaluating mathematical expressions found in Appendix B. These expressions allow managers to calculate (in dollars) the resources required in training and implementation of any safety training requirement.

6.2.4 Minimum Components of Training

NCDOT is responsible for establishing training programs that will ensure that each employee is instructed regarding job hazards and the methods by which these hazards are controlled.

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The minimum components of NCDOT's training shall include:

- Orientation of New Employees to NCDOT's Safety Program
- Issuance of Employee Handbook
- Specialized Training
- Training Records

Orientation of new employees to NCDOT's Safety Program shall include training in:

- Employee responsibilities
- Employee rights under OSHA
- OSHA regulations applicable to their job
- Applicable requirements in NCDOT's Workplace Safety Manual and the Safety Policy and Procedure Manual

Orientation will include introduction to the NCDOT safety program, information about any known hazards in the workplace, a review of hazard recognition, the use of PPE, how to safely perform assigned job tasks, and the safe operating procedures for each task and piece of equipment to which the employee will be exposed.

Additional material to be covered during orientation includes all chapters applicable to the employee in both the NCDOT Safety Policy and Procedure Manual and the Workplace Safety Manual (WSM).

The issuance of employee handbook, titled *North Carolina State Employee's Safety and Health Handbook*, will occur to all NCDOT employees during their initial orientation. The contents of this handbook are to be reviewed with each employee. The employee must sign and date of the last page of the handbook and return this page to his or her supervisor. Figure 1 presents the contents of this handbook's last page. This page from the employee will be filed in the employee's personnel file.

Specialized training must be established in safety requirements for employees based on job function, job classification, and exposures to hazards.

(Please sign, detach, and return to your supervisor.)
I hereby acknowledge receipt of a copy of the
North Carolina State Government Safety and Health Handbook
I understand that it is my responsibility to become familiar with and abide by these instructions, insofar as they apply to the duties which I shall perform for State Government. (A copy of this certification will be filed with the employee's personnel records.)
Employee's Signature: _____
Department: _____
Date: _____

Figure 1

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Training records will be maintained of all training received by employees. As a minimum, training records shall consist of:

- Training course name of training and course outline and/or lesson plan
- Location, date and time the training was conducted
- Names, job title and unit of all employees in attendance
- The instructor(s) name, title and unit
- Copies of any certificates of training issued for the course

Training records shall be stored at the Division/unit office in a file folder (or via computer records) labeled with the corresponding course title for each course provided to employees.

Appendix C contains a training records form for use by NCDOT personnel.

6.2.5 Training Guidelines

NCDOT's safety training program uses the instructional systems development (ISD) process as a means to establish an ongoing training program. The components of the ISD model should be used as a process guideline when an individual within the department begins development or assessment of training products. The components of this process are:

- Analysis - recognition of a flaw that can be corrected through training
- Design - what needs to be taught and how and by whom
- Development - production or procurement of the training materials
- Implementation - provide the training
- Evaluation - measuring the results and making any necessary corrections to the course

Appendix D details the specifics of this training model.

6.2.6 Matching Training to Employees

Training appropriate to the assigned job task is crucial to the effectiveness of safety training. Therefore, it is recommended that NCDOT managers/unit heads:

- Identify the employees at risk
- Train the employees at risk

Identifying the employees at risk can be accomplished by pinpointing hazardous job classifications, examining the incidents of accidents and injuries, and identifying certain variables that disproportionately contribute to accidents and injuries.

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Pinpointing hazardous job classifications identifies employees at high levels of risk. In some cases, hazards of a job classification are influenced by the conditions under which the job is performed, such as noise, heat or cold, or safety or health hazards. In these situations, employees should be trained not only on how to perform their jobs safely, but also on how to operate within a hazardous environment.

Examining the incidents of accidents and injuries both within NCDOT and within transportation departments of other states is another good tool. If employees in certain job classifications are experiencing higher accident and injury rates than other employees, training may be one way to reduce that rate. In addition, thorough accident investigation can identify not only specific employees who could benefit from training but also identify NCDOT-wide training needs.

Identifying certain variables that disproportionately contribute to accidents and injuries can also be used to identify employees at risk. The following variables have been identified as contributing to a disproportionate share of injuries and illnesses at the worksite:

- The age of the employee (younger employees have higher incident rates)
- The length of time on the job (new employees have higher incident rates)
- The type of work performed
- The use of hazardous substances

These variables should be considered when identifying employees' safety training needs.

Training the employees at risk is the next step once the at risk employees are identified. Managers/Unit Heads should then consult the Safety Training Matrix (Appendix A) to match the appropriate training to the employee.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for training in their areas. They will also be responsible for identifying the appropriate safety training for employees in their organization. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

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6.3.2 Supervisors

Supervisors will not allow any employee to perform hazardous tasks or activities without proper training.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors are responsible for ensuring that only trained and qualified employees are assigned or permitted to perform duties that may be hazardous.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

It is the responsibility of each employee to identify potential hazards associated with required work assignments and report those suspected hazards to his or his supervisor immediately.

It is also the responsibility of each employee to refrain from work involving exposure to potential hazards without instruction/training specific to the hazards of the tasks involved and/or close guidance by a responsible party trained in the recognition and avoidance of hazards.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning safety and health training. Additionally, the Safety Training Manager will coordinate the development of required safety training.

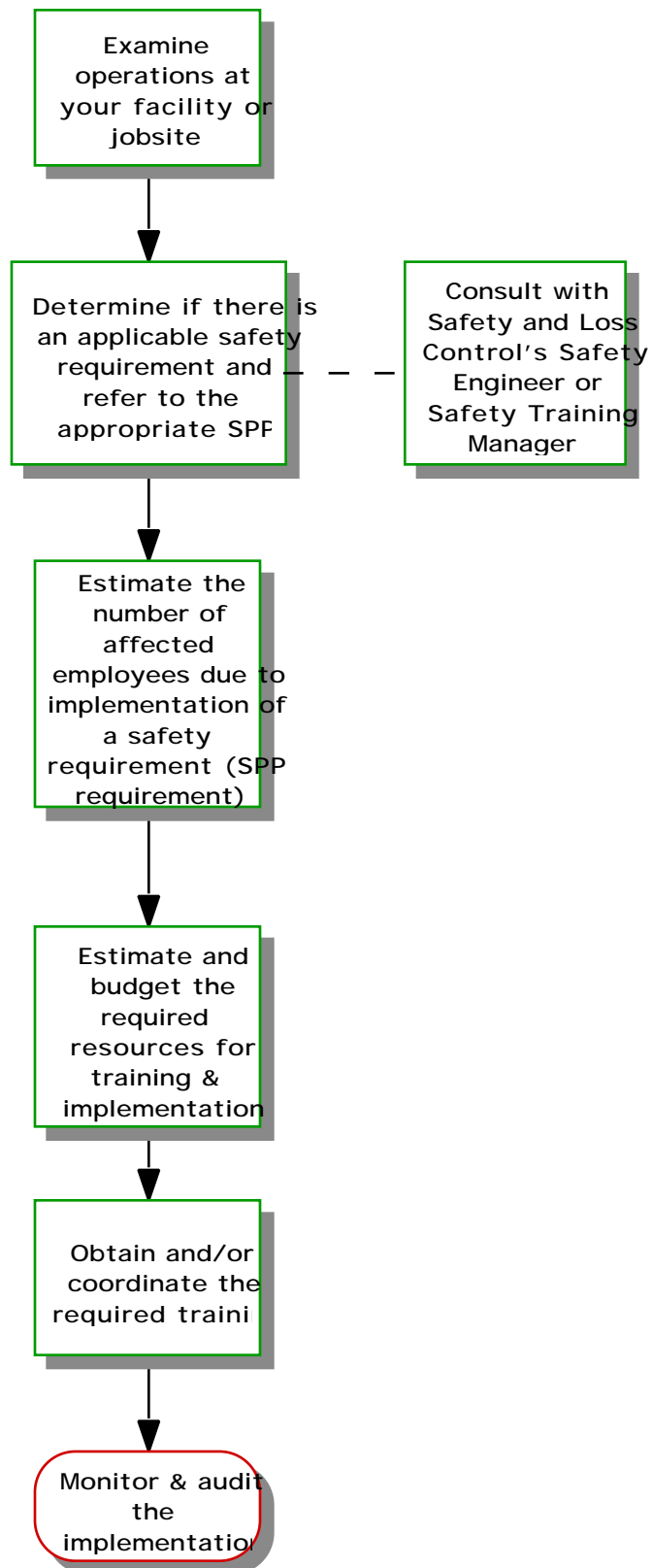
The Safety Training Program Standards Committee will have the general responsibility of reviewing new safety training courses prior to their implementation and also for reviewing modifications to any existing safety training courses.

The Safety Training Manager and Safety Engineers will provide consultative and audit assistance to ensure the effective implementation of this safety policy and procedure.

6.3.5 Division Safety Officers

Division Safety Officers will maintain training records in their divisions in accordance with the requirements in Section 6.2.2.

Safety Training Flowchart



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APPENDIX A: NCDOT's Safety and Health Training Matrix

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Hazard Communication [(1910.1200(h))* & (1926.59(h))* (SAF# 130)]	1910.12	Orientation; Pre-assignment / Post-Incident & as new hazards are introduced	All DOT Employees	2	1.5	Placarding signs, MSDS sheets, HAZCOM posters, OSHA standards, TWVCR, PPE info, eyewash & shower instructions, overhead projector	IN/CC
Occupational Exposure to Hazardous Chemicals in the Laboratory(1910.1450 (f)(1))	TBD	Pre-assign, periodic	MLT lab	1.5	1	Laboratory, Placarding signs, bootcamps, VCR/TV	JIT
Personal Protective Equipment & PPE Hazard Assessment (1910.134-138)*	1910.132	pre-assign & annual	At risk DOT employees identified through hazard assessment	(varies) 3 max.	(varies) 3 max.	Classroom, appropriate PPE, Hazard assessment for each situation, VCR/TV, booklets	IN/TP
Asbestos-Level III (1910.1001)*	1910.1001A 1910.1001A	TBD	Operations & heavy maintenance, facilities management & their supervisors	16	16	Haz Assessment, PPE, TWVCR; hand-outs/brochures	CIN
Asbestos-Level IV-Awareness (vehicle brakes)(1910.1001)*	1910.1001	TBD	Equipment shop (Brake inspection/repair) & their supervisors	3	3	Haz Assessment, PPE, TWVCR; hand-outs/brochures	CIN
Asbestos-Level IV-Awareness(1910.1001)*	1910.1001	TBD	Custodial, equipment & maintenance shop	2	2	Haz Assessment, PPE, TWVCR; hand-outs/brochures	CIN
Bloodborne Pathogens (1910.1030)*	1910.1030	Orientation, pre-assign, annual	Custodial, construction, Safety Officers, MLT lab, Drivers, maintenance, ferry crew & operations; DMV enforcement, supervisors, Designated Fleet Aid responders	2.5	1.5	TWVCR; PPE; Overhead projector, booklets. Trainee must be familiar with Hazard Assessment concepts or have successfully completed the Hazard Assessment/PPE course	IN (Personnel)

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APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 2

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Ergonomic Awareness for Employees (Proposed 1910 Appendix D)	TBD (Chapter 14)	Orientation, Pre-assignment, post-accident assessment	All clerical positions, warehouse, maintenance, equipment, DMV, HWY, DMV enforcement	1-3 (varies by job class)	1.5	Ergo standards, VCR/TV, booklet, manual	IN
Ergonomics Risk Assessment (Proposed 1910 Appendix D)	TBD (Chapter 14)	Promotion & annual	Supervisors, SE's & others involved in Ergo risk assessment	24	10	Ergo standards, calculator, anthropometry tables, VCR/TV, booklet, manual, other	TP/CIN
Ionizing Radiation (1910.96(i)(2)* and 1926.63(k)(2)*) [SAF 100 & 200]	1910.96	Pre-assign & periodic	Maintenance, Construction	6	2	Haz assessment, HRC info, PPE, TV/VCR	IN&TP
Lead (1910.1025)* (1926.62)*	1910.1025	Pre-assignment, annual	SW, SL, DMV enforcement officer, equipment shop, Ferry maintenance	2.5	2.5 (includes proficiency exam)	Initial HAZ Assessment & PPE training, TV/VCR handouts, subacute data sheet, Employee standard and summary, other handouts	CIN
Medical and First Aid (1910.151(b)* ; 1926.50(c)* ; 1915.95*)*	1910.151	Pre-assigned, annual for CPR ; every 3 years for First Aid (Pre-assigned & annual for Divers, Ferry Crew, DMV & Rest Area Custodians)	Two volunteer employees per candidate or office (All Divers, Ferry Crew, DMV enforcement, & Rest Area Custodians)	8	4 hrs. for First Aid; 8hrs for First Aid & CPR	CPR/First aid manuals, first aid kits, overhead, TV/VCR, bloodborne pathogens & hazard assessment, PPE training	TP/CC
Nonionizing Radiation (1910.97 & 1926.64)	1910.97	Pre-assign & annually	M&T, welders, Ferry, DMV Enforcement, Traffic Engineering, Highway Maintenance, Construction, Aviation, L&S, Geotech	1	1	Haz assessment, PPE, handouts/brochures, TV/VCR, MAT course's 250; 360; 375	IN
Nonionizing Radiation [(1910.97 & (1926.64 Laser*))]	1910.97	Pre-assign & annually	M&T lab	1.5	1	Haz Assessment, PPE, handouts/brochures, TV/VCR	IN

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APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 3

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Occupational Noise Exposure [SAF 245](1910.95)*	1910.95	Orientation, Pre-assignment, post hearing loss diagnosis	Determined by TWA exposure & through the HCP	2	2	VCR/TV, handouts, hearing protection, OSHA standards poster	IN/TP
Employee Emergency Plan [1910.38 (a)(6)]*	1910.38	Orientation, new location assignment, periodic	All	1	1	Emergency plan, floor plan with emergency exits and routes marked, location of emergency showers (where applicable) & location of fire extinguishers, portable fire extinguisher	IN (This course should be taught in conjunction with the Fire Prevention course)
Fire Prevention Plans [1910.38(b)(4)]*	1910.38	Orientation, new location assignment, periodic	All	1.5	1.5	Emergency plan, VCR/TV, handouts, fire-light disposal cans, general housekeeping plan	IN (This course should be taught in conjunction with the Employee Emergency Plan course)
Employee Emergency Evacuation Team [1910.38 (Appendix 3)]	1910.38	Pre-assignment, periodic	All team members	3.5 (with demo)	3 (with demo)	Emergency plan, floor plan with ward zones, emergency exits and routes marked, location of fire extinguishers, a portable fire extinguisher, safety vests & hats, general housekeeping plans, flashlight, wheel chair, TV/VCR, handouts	IN

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APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 4

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Portable Fire Extinguishers (SAF160)(1910.157(g) & 1928.150 & 1910.179(D)(3))*	1910.157	Initial assignment & annual	MO, equipment operator, ferry crew, HMMW, equipment shop, crane operator, welders, overcurrent team	2	1	Type ABC Portable fire extinguisher, fireproof bucket & materials, outdoor area for burning, VCR/TV, overhead	IN
Fire Prevention and Protection for Welding, Cutting, and Brazing (SAF 160)(1928.152(e) & 1910.252(e))	1910.252	Pre-assign, periodic	Welders, watch personnel & their supervisors	1	1	Booklets; VCR/TV; PPE; Portable fire extinguisher	IN/JIT
Arc Welding Equipment (SAF165) (1910.254 and 1928.351)*	1910.254	Pre-assign, periodic	Welders	1.5	1	Welding equipment, PPE, booklets	IN/JIT or CC
Oxygen-Fuel Gas Welding and Cutting (EQP 106)(1910.253 and 1928.350)	1910.253 & 1910.101	Pre-assign, periodic	Welders	2	1	Welding equipment, PPE, booklets	IN/JIT or CC
Resistance Welding SAF 155(1910.255 (e)(3))	1910.255	Pre-assign, periodic	Welders	1.5	1	Welding equipment, PPE, booklets	IN/JIT or CC
Electrical Safety Related Work Practices (1910.331-335)*	1910.331	Orientation, Pre-assign, annual	Any employee exposed to a non-protected energized source; electrical area; welders, riggers/maintenance and general services; auto clubs; JCO, aerial truck operators, mechanics, EM, BW, warehouse, carpenter, HMMW, ferry & their supervisors	1-4 (varies by job class)	2	Mock electrical outlets, cords, lockout/tagout info, PPE,	IN/JIT
Ground Fault Protection-competent person (1928.404(b)(iii)) and 1916.502)	1910.331	Orientation, pre-assign for electricians, annual	Construction, maintenance, warehouse, ferry, BW, EM, etc.	2.5	1.5	Mock electrical outlets, cords, lockout/tagout info, PPE	IN

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APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 5

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Lockout/Tagout (1910.147(c)(7))*	1910.147	Pre-assign, annual, periodic (general employees)	Electricians, maintenance, equipment, repair crews, construction, fill, ferry	0.5/3	2 (w/proficiency)	Mock electrical outlets, cords, pipe stem valves, lockout/tag out info & tags, PPE	IN
Compressed Air Equipment ((1910.169)(1926.308))	1910.169	Pre-assign, annual	Compressed air Equipment operators; maintenance, construction, BW, equipment	2	1.5	Equipment, power source, PPE, VCR/TV, manufacturer's info,	JIT
Cranes (BRG 150; SAF 210)((Crawler; Locomotive; Truck & Wheel Mounted) (1910.180(b)(3))	1910.178	Pre-assign, annual & post incident	All employees designated to serve as crane operators and crane competent persons	16	8	Crane, VCR/TV, manual, books & handouts	CIN
Overhead & Gantry Cranes (BRG 180; SAF 210) (1910.179)	1910.179	Pre-assign, annual & post incident	Any employee designated to serve as a crane operator	8	4	Facilities, overhead crane, VCR/TV, booklet	IN;JIT
Forklifts, Tractors, and Other Powered Industrial Trucks [SAF 240] (1910.178)*	1910.178	Pre-assign, post-incident & annual	All employees authorized to operate the equipment; Warehouse, depot maintenance, construction, ferry, equipment yard	3.5	1	TV/VCR, handouts/booklets	IN;JIT
Excavation, Trenching, and Shoring-Competent Person Training(1926.650*) (SAF 250)	1926.650	Pre-assign & annual	Construction, BW,	8	8	VCR/TV, overhead, manuals & course guides, OSHA standard	CIN OR TP(NCEU)
Shoring & Trenching Workshop-Train the Trainer (1926.650)	1926.650	DOT Construction Inspectors for Contract projects		32	32	Funding	TP(NCEU)
Explosives and Blasting Agents-Blastar (SAF 150)((1910.109 and 1926.801))*	1910.109	Pre-assign, annual	Designated blasters	32(inc. proficiency exam)	8(inc. review & proficiency exam)	VCR/TV, overhead, slides, course material, BATF info, blasting materials, signs, and outdoor facilities	CIN

SAFETY POLICY & PROCEDURE

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 6

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Explosives and Blasting Agents-Supervisors (1910.109 and 1926.900)	1910.109	Post designation of blaster	Supervisors of blasters	8	n/a	VCR/TV, overhead, slides, course materials, BATE info, blasting materials, signs, and outdoor facilities	GM
Chain Saw Safe Operations [SAF# 153]	TBD (Chapter 10)	Pre-assign, annual, post incident	All employees operating a chain saw	2	1.5	Chain saws, ear guard & rib, chaps, PPE, Hazard assessment, sample logs	IN
Wood Chipper Safety Training (EQP 250)	TBD	Pre-assign, periodic	Any employee assigned to use the wood chipper	2	1.5	Wood chipper & small limbs, fuel, PPE, Hazard assessment sheets	JIT
Flammable and Combustible Liquids (1910.106)	1910.106	Pre-assign, periodic	HAAP drivers, Pavement Management, construction, L&S, Hydraulics, Geotech, T&E, GW, Gas house attendants, spray paint operations	2	n/a	VCR/TV, overhead, fire extinguisher, approved flame cone, location of emergency cut off switches at pumps, first aid kit	IN:JIT
Confined Space-Entry & Observer Personnel (SAF 275)(1910.146(g))*	1910.146	Pre-assignment & annual	TBD but anyone having to enter a confined space as defined by 1910.146(b) (Maintenance, equipment, ferry, B, construction, Design Services, Geotech)	4-6 hrs inc. proficiency exam	4 inc. proficiency exam	Posting signs, HAZCOM posters, OSHA standards, TV/VCR, PPE info, overhead projector	GM
Confined Space-Entry Supervisor(1910.146(g))*	1910.146	Prior to being placed on site as a confined space entry supervisor & annual	Any employee designated & trained as a confined space entry supervisor	8	8	Posting signs, HAZCOM posters, OSHA standards, TV/VCR, PPE info, overhead projector	GM/TP
Confined Space-Train the Trainer	1910.146	Pre-assignment	Any employee selected to provide Confined Space Training (inc. SE's)	8	4	Posting signs, HAZCOM posters, OSHA standards, TV/VCR, PPE info, overhead projector	GM/TP

SAFETY POLICY & PROCEDURE

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 7

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Ventilation (1910.94)(1926.57 & .353)	TBD (Chapter 14)	Orientation, pre-assignment	BW, P&H, welders, equipment shop, maintenance shop, M&T lab, photography, reproduction	1-3 (varies by job class & exposure)	As determined by periodic hazard analysis or post incident	Classroom, VCR/TV, handout	IN
Demolition (mechanical)-competent person(1926.858(g))	TBD	Pre-assign, periodic	Construction, facility management	2	2	Standard, VCR/TV, overhead, handouts, Asbestos standard, PPE, Hazard communication info	IN
Respiratory Protection [(1910.134(b)(3) & 1926.103(a)(3)]*	1910.134	pre-assign and where applicable, after passing physical	Bridge inspectors & certain BW, construction, alignment shop, landscape	6	3	Vacuum respirators, overhead projector, VCR/TV	IN/TP
Power Operated Hand Tools & Power Lawn Mowers[(1926.302)(1910.241)]	1910.241	Pre-assign, post-incident & periodic	Bridge work, construction, shop, maintenance, H&M, landscape	2 (Profic. exam)	2(demo exam/discussion)	VCR/TV, various power hand tools, handouts, overhead	JIT
Machine Guarding for Mechanical Power Presses (1910.217(e)(3);(f)(2);(h)(13))*	1910.217	Pre-assign & annual	Equipment shop, mechanics	2.5	1.5	OSHA Standard, manufacturer info, ANSI B11.1-1971	IN
Machine Guarding for Woodworking Machinery (1910.211-216) (1926.300& 304)*	1910.211	Pre-assign & annual	Carpenter, H&M, equipment shop, BW	1.5	1(less if pass a competency exam)	Classroom, OSHA standards, posters, handouts, prior Hazard assessment training	IN
Scaffolding-Competent person (1910.28)(1926.451(a))	1910.28	Pre-assign, periodic, post incident	Construction, B&M, maintenance, Ferry shipyard, competent person	3	2 (exam & on-site)	Yard, VCR/TV, Photos of scaffolding (Good & bad); Handouts	IN

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APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 8

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Ladders (1910.25-27 & 1926.1060(a)(b))*	1910.25 & 1910.27	Pre-assign & post incident	construction, maintenance, custodial, general services, facilities management	1.5	1	various ladders, lanyard, VCR/TV, booklets, training material	IN/JIT(w/ certification)
Aerial Truck Operations(1910.67(c)(II))*	1910.67	pre-assign & annual	Traffic services, bridge inspectors	4	2.5	Aerial truck,VCR/TV, overhead, portable fire extinguisher,safety belts,lanyard,etc	IN/TP
Fall Protection [(Competent person)(1926.503)]*	TBD	Pre-assign, periodic	Designated competent persons in construction, bridge, aerial truck & ferry	2.5	2	Various fall protection devices, VCR/TV, booklets, training material	IN
Diving Operations [(1910.410(a))(1926.1076(a))]*	1910.410	Pre-assign & annual	Bridge Diver	16	12	SCUBA gear, charts,books,VC R/TV,HSP B,Hazard assessment & PPE training	IN & TP(CPR)
Safety Training and Education (1926.21)*	1926.21	Orientation,pre-assign (pre-assign & annual for supervisors)	All DOT employees	3.5	3	VCR/TV,Supervisor Safety Manual	IN
Servicing of Single Piece and Multi-Piece Rim Wheels [SAF 188](1919.177(c)*	1910.177	Pre-assign,annual	Road maintenance, mechanics, MAP & bridge maintenance, others	5(pro-ficiency)	4 [(varies) (inc.pro fic- lency)]	Shop,tree,VCR/ TV,book- letslampshades, equipment	JIT/IN/TP
Signaling & Traffic Control [SAF 238] (1926.201(a)) Flagger Training [ITRE]	1926.201	Pre-assign & annual	Construction, maintenance, HBMV,BW, flaggers	4	4	classroom, TV/VCR,Outdoor training facilities	C/IN
Work Zone Safety Traffic Control (Basic) [SAF 230](1926.201) [ITRE]	1926.201	Pre-assign & annual	Field work zone supervisors of all flaggers	6	4	classrooms, TV/VCR,Outdoor training facilities	TP(ITRE)
Work Zone Traffic Control (1926.201) (Intermediate) [ITRE]	1926.201	Pre-assign & annual	Division & Resident Engineers; Supervisors of Construction, maintenance,H BMV, & BW flaggers	8	6	classroom, TV/VCR,Outdoor training facilities	TP(ITRE)

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APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 9

Course Name and Number w/ Standard	SPP1	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Work Zone Traffic Control (1828.201) (Advanced) [ITRE]	1828.201	Pre-assign & annual	Division & Resident Engineers; Supervisors of Construction, maintenance, HMM, & BW Soppers	12	8	classrooms, TV/VCR, Outdoor training facilities	TP(ITRE)
Spill Response (1910.120 (q)(6)(i)) (First Responder-Awareness & Operations)[SAF 315]*	TBD (Chapter 9)	Orientation, pre-assign	HMM, Construction, BW, GUY, Divers, Ferry crew, maintenance & shipyard; construction, maintenance & equipment supervisors; General Services, MAP, Devt Enforcement	8	8	classroom, TV/VCR, Outdoor training facilities, equipment	IN/TP
Spill Response (1910.120 (q)(6)(i)) (First Responder-Awareness Plus for MAP Drivers)[SAF 315]*	TBD	Before assignment & annual	MAP Drivers	8	8	VCR/TV, Outdoor training facilities, equipment, manual, overhead, booklets	CIN
Spill Response [SAF 320] (1910.120 (q)(6)(ii)) (First Responder-Operations & Technical Operations)*	TBD (Chapter 9)	Pre-assign & annual	Selected Ferry Division employees	32	32	TV/VCR, Outdoor training facilities, equipment	CIN
Spill Response (1910.120 (q)(7) [TRAINERS]*	TBD (Chapter 9)	Pre-assign & annual	Any DOT employee selected to provide the Spill response Awareness &/or Operations level training	11	3 (inc. competency exam)	VCR/TV, Outdoor training facilities, equipment, manual, overhead, booklets	CIN
Hazardous Waste Management Training for Small Quantity Generators-[SAF 315](49CFR282)*	TBD	Pre-assign & annual	Equipment, traffic services, road oil, landscape, divisional, ferry, bridge	8	4	classroom, TV/VCR, Outdoor training facilities, equipment	TP(DEHNR)

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APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 10

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Back Belt Training	1910.001	Pre-assignment to manual lifting positions & upon request for others.	Warehouse; maintenance; equipment; construction; general services	2	1 (exam) & 10 techniques	Training material; backbelt; TWCA	IN
Fleet Safety (Instructor)[SAF #111]	TBD (Chapter 8)	Annually	Designated employees who will provide Fleet Safety training; S.O.	32	32	Two Lead Instructors; classrooms; Overhead transparency projector; TV & Video Player, writing utensils, paper, Outdoor Vehicle Driving range	IN
Fleet Safety Course [SAF #110]	TBD (Chapter 8)	Pre-employment/pre-assignment/annually	All DOT Employees who operate fleet vehicles	16	8	Certified Fleet Safety Instructor and same as above	CIN
Vehicle Backing Safety [SAF 420]	TBD	Pre-assign, annual	All DOT Employees who operate fleet vehicles	4	4	Certified Fleet Safety Instructor, Overhead transparency projector; TV & Video Player, writing utensils, paper, Outdoor Vehicle Driving range, appropriate vehicles	CIN
Motor Vehicles, Excavating and Material Handling Equipment (1926.602)	TBD	Pre-assign, annual, post-incident	M/O, maintenance, construction, landscape	3	3	Regdats, VCR/TV, vehicle driving range	IN; JIT & TP
Motorist Assistance Patrol Safety Related Training	TBD (Chapter 6)	Pre-assignment	MAP drivers	TBD		VCR/TV, PPE, MAP Inck, passed the DOT Fleet safety course, driving course, Hazard Assessment & Hazard Communication (First Responder Awareness) trained	CIN
Roll-over Protective Structures for Tractors (Industrial) (1928.1091 & 1002)	TBD	pre-assign, periodic & post incident	M/O, Landscaping, construction, some houses, equipment	1	n/a	Construction material, VCR/TV Overhead	JIT

SAFETY POLICY & PROCEDURE

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 11

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
OSHA 200 Log	TBD (Chapter 1)	Pre-assignment	All employees involved with the recording & maintaining of the OSHA 200 Log	1.5	n/a	TV/VCR player, Recording Guide for Occupational Injuries & Illnesses	IN
Workers' Compensation Seminar for Supervisors(SAF #425)	TBD (Chapter 1)	Within 2 months of promotion & an annual refresher	All Supervisors & managers & any Clerical Support staff involved with the administration of the DOT WWC program	3.5	2	TV/VCR player; handouts; videos; overhead transparencies	IN
Supervisor Safety Responsibilities [SAF 010]	TBD (Chapter 6)	At initial promotion & an annual refresher	All supervisors & managers	4(inc. review)	2	Keller's official safety handbook; Accident Prevention Manual, NSC Supervisors Safety Manual	IN
Beyond Compliance- For Upper Level & Mid Level Managers & First Tier Supervisors	N/A	Periodic	All supervisors & managers	4	n/a	Classroom, TV/VCR; TP- Hines, Coleman & Associates	TP: First Time course/Try of only
Violence in the Workplace	TBD	Orientation & periodic	All DOT employees	4	2	Classroom, TV/VCR, overhead, handouts, pamphlets	IN
Keys: *OSHA mandated and non-mandated training		† Although not listed, all courses require an indoor classroom, Workplace Safety Manual, writing board or flip chart, markers, and restroom facilities. Some courses also require an outdoor classroom.					
* All applicable references are not listed in this matrix. Consult the "Reference" section of the Lesson Plans for a more complete listing of the resources used for a particular course.							
- Codes for the method of training are: IN = Internal training by DOT employee/trainer; CEN = NCDOT Certified Trainer; CC= Community College; TP= Third Party; JT= Job Instructional Training							

APPENDIX B: Estimating Resources to Implement Safety Training

NCDOT managers can estimate total resources required for a particular safety requirement by evaluating the following mathematical expressions:

Equation (1) $R_T = E_A \times T_{TI} \times W_{EA}$

Where:

- R_T = Training resources required (\$)
- E_A = Number of affected employees
- T_{TI} = Initial length of training (hours)
- W_{EA} = Average hourly wage of the affected employees (\$/hour)

Equation (2) $R_I = (E_I \times T_I \times W_I) + P_C$

Where:

- R_I = Implementation resources (\$)
- E_I = Number of implementation employees
- T_I = Implementation time (hours)
- W_I = Average hourly wage of the implementation employees (\$/hour)
- P_C = Cost of Physical Resources (\$)

Equation (3) $S_R = R_T + R_I$

Where:

- S_R = Total resources required for a safety requirement

Likewise, NCDOT managers can also calculate refresher training resources requirements from equation 1, except substitute the refresher length training for T_{TI} .

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APPENDIX C: Training Records Form

Course Title and Number	Date(s)	Location	Instructor(s)

This course offers _____ *Professional Development Hours* (PDH) from the NC Board of Professional Engineers and Registered Land Surveyors.

Name	ID #	Div/Unit	NC Board Registration # (For PDHs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
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_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

APPENDIX D: NCDOT Training Model

Safety training shall be provided to employees during orientation, before doing any new job task and when a new procedure, process, or equipment is implemented before problems or accidents occur. Safety training will cover both general safety and health rules and work procedures, will cover how to safely perform the job task, recognition of hazards, the proper use of appropriate PPE, and safe operating procedures for each task and piece of equipment used for that task.

Analysis

The first step in the training process is to determine whether a problem can be solved by training. The analysis phase is used to determine what corrections are needed and to identify the important elements of the tasks. Supervisors and managers/unit heads should constantly assess (analyze) job site conditions and note deficiencies that can be corrected through training. Some of the conditions that should prompt additional safety training include:

- High labor turnover
- Increased incidents, accidents, injuries or near misses
- Implementation of new processes, equipment or procedures
- A lack of training or improper training from a previous employer
- A lack of knowledge of a work process
- Unfamiliarity with equipment
- Incorrect execution of a task

The employees themselves can provide valuable information on the training they need. Employees can identify safety and health hazards regarding:

- Concerns about job tasks
- Near-miss incidents
- Risks they are taking
- Jobs that involve hazardous operations or substances

Analysis regarding a need for training should preclude the possibility that other actions (such as hazard abatement or the implementation of engineering controls) would enable employees to perform their jobs properly.

Design

During the design phase the course developer uses the information gathered during the analysis phase and applies that information towards:

- Identifying course objectives

APPENDIX D: NCDOT Training Model (Continued) 2

Design (continued)

- Testing methods (for measuring retention and skill levels)
- Sequencing and structuring of delivery

Course objectives define observable, measurable and attainable goals which can be demonstrated by the participant. Proper demonstration by the participant indicates that the learning material or process has been retained and that the employee is capable of applying what was taught to the job task.

For a course objective to be effective, it should precisely identify what the individuals will do to demonstrate what they have learned or that the course objective has been reached. They should also describe the important conditions under which the individual will demonstrate competence and define what constitutes acceptable performance.

Using specific, action-oriented language, the instructional objectives should describe the preferred practice or skill and its objective behavior. For example, rather than using the statement: “The employee will understand how to use a respirator” as an instructional objective, it would be better to say: “The employee will be able to describe how a respirator works and when it should be used.”

Objectives are most effective when worded in sufficient detail that other qualified persons can recognize when the desired behavior is exhibited. For this, it is necessary to identify what the employee is expected to do and in what ways, if any, the employee’s performance is deficient. This information can should be obtained during the analysis phase and should pinpoint what an employee needs to know in order to perform his/her job.

A variety of training presentation styles and methods can be used depending upon the course location, the prospective students, available resources, i.e. classrooms, and the particular course objectives. Some of the various presentation styles used include:

- Lecture
- Lecture/discussion
- Demonstration

Development

The development phase involves creating or procuring instructional material, learning activities, and the delivery system (i.e. rooms, tables, equipment required, etc.). Course content can be developed through lesson plans, including instructor and participant outlines. Content of the lesson plans can be determined by such means as:

APPENDIX D: NCDOT Training Model (Continued) 3

Development (continued)

- Using accident and injury records to identify the type of accidents and how they occurred and what instructional material and method can be used to prevent them from recurring.
- Requesting employees to provide, in writing and in their own words, descriptions of their jobs including the tasks performed and the tools, materials, and equipment used.
- Observing employees at the worksite as they perform tasks, asking about the work, and recording their answers.
- Examining similar training program courses offered by other companies in the same industry.

Factors used to determine the type of learning activity to be incorporated into the training include:

- Training resources available to the employer
- Group training program that uses an outside third party trainers
- Personally training the employees using internal trainers or one-to-one mentors

Other factors include the kind of skills or knowledge to be learned. Is the learning oriented toward physical skills (such as the use of special tools) or toward mental processes and attitudes? Such factors will influence the type of learning activity designed by employers. The training activity can be group-oriented (with lectures, role play, and demonstration) or designed for the individual (with self-paced instruction).

The determination of methods and materials for the learning activity can be as varied as imagination and available resources will allow. Charts, diagrams, manuals, slides, films, viewgraphs (overhead transparencies), videotapes, audiotapes, or blackboard and chalk, or any combination of these and other instructional aids may be used. Whatever the method of instruction, the learning activities should be developed in such a way that the employees can clearly demonstrate that they have acquired the desired skills or knowledge.

Implementation

The training should be presented so that its organization, meaning, and objectives are clear to the employees. To achieve this trainers should:

- Provide overviews of the material to be learned
- Relate, wherever possible, the new information or skills to the employees' goals, interests, or experiences

APPENDIX D: NCDOT Training Model (Continued) 4

Implementation (continued)

- Reinforce what the employees learned by summarizing the program's objectives and the key points of information covered

In order to be motivated to learn the course material, the employees must be convinced of its importance and relevance. Among the ways of developing motivation are:

- Explaining the goals and objectives of instruction
- Relating the training to the interests, skills, and experiences of the employees
- Outlining the main points to be presented during the training session(s)
- Pointing out the benefits of training

An effective training program allows employees to participate in the training process and to practice their skills or knowledge. This will help to ensure that they are learning the required knowledge or skills. Employees can become involved in the training process by participating in discussions, asking questions, contributing their knowledge and expertise, learning through hands-on experiences, and through role-playing exercises.

Training presentations can be given in a variety of methods depending upon the location of the training, the prospective students, available resources, i.e. classrooms and particular course objectives.

Evaluation

To ensure that the training program is accomplishing its goals, an evaluation of the training can be valuable. Training should have a method of measuring the effectiveness of the training. An evaluation of training can give employers the valuable information regarding the training provided to its employees.

A plan for evaluating the training session(s) should be developed when the course objectives and content are developed. It should not be delayed until the training can be completed. Evaluation will help determine the amount of learning achieved and whether an employee's job performance has improved. Among the methods used in training evaluation are:

- Student opinion - post training questionnaires or informal discussions with employees can help employers determine the relevance and appropriateness of the training program provided.
- Supervisor observations - supervisors are in good positions to observe, evaluate and analyze employees' performance both before and after the training and note improvements or changes.
- Workplace improvements - the ultimate success of a training program may be exhibited in changes throughout the workplace that result in increased productivity through safer operating habits, reduced injury or accident rates, and lowered lost workdays.

APPENDIX D: NCDOT Training Model (Continued) 5

Evaluation (continued)

If, after evaluation, it is clear that the training was unable to provide the employees with the level of knowledge and skill that was expected, then it may be necessary to revise the training program or to retrain those individuals who do not meet the necessary course objectives. Among the questions that could be asked employees and trainers are:

- Were parts of the content already known and, therefore, unnecessary?
- What material was confusing or distracting?
- Was anything missing from the program?
- What did the employees learn and what did they fail to learn?

It may be necessary to repeat steps in the training process; that is, to return to the first steps (analysis and design) and retrace the training process. As the program is evaluated, the following questions should be asked:

- If a job analysis was conducted, was it accurate?
- Was any critical feature of the job overlooked?
- Were the important gaps in knowledge and skill included?
- Was material already known by the employees intentionally omitted?
- Were the instructional objectives presented clearly and concretely?
- Did the objectives state the level of acceptable performance that was expected of employees?
- Did the learning activity simulate the actual job?
- Was the learning activity appropriate for the kinds of knowledge and skills required on the job?
- When the training was presented, was the organization of the material and its meaning made clear?
- Were the employees motivated to learn?
- Were the employees allowed to participate actively in the training process?
- Was the employer's evaluation of the program thorough?

A critical examination of the steps in the training process will help assist in determining whether any course revisions are necessary. Using these steps will assist in presenting the training in a clear manner.

Sanitation**SPP# 1910.141****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines to ensure that a clean and sanitary work environment is provided to North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Sanitary and healthy workplace conditions promote a productive work environment and ensure that employees' health and welfare are well protected.

This safety policy and procedure includes provisions for training and discussion on the sanitation requirements for construction jobsites and facilities.

It also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure applies to all NCDOT employees.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.141) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.51).

SAFETY POLICY & PROCEDURE

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT construction jobsites and facilities will be kept clean, sanitary, and equipped for employee health. When sanitation hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Sanitation will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Sanitation. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Sanitation.

6.1 Definitions

Chemical Toilet

Portable toilet that uses chemical disinfection.

Lavatory

Basin or similar vessel used exclusively for washing of the hands, arms, face, and head.

Nonpotable Water

Water that is not approved for drinking.

Potable Water

Water approved for drinking by the State or local authority.

Toilet Fixture

Fixture maintained within a toilet room for the purpose of defecation or urination or both.

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Toxic Material

Material in concentration or amount which exceeds the applicable limit established by a standard.

Urinal

Toilet facility maintained within a toilet room for the sole purpose of urination.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Construction Jobsite Sanitation Requirements
- Facility Sanitation Requirements

6.2.1 Training

NCDOT employees shall be instructed on the importance of sanitation in their workplaces. Good housekeeping and personal cleanliness in employee's job duties shall be emphasized to all employees. Additional specific job training will be conducted as conditions warrant. Employees shall be instructed upon initial employment or new job assignment.

6.2.2 Construction Jobsites Sanitation Requirements

Sanitation at construction jobsites must be properly managed and effectively integrated with the construction site activities. The components of a construction jobsite sanitation plan should include provisions for:

- Potable water
- Nonpotable water
- Toilets at construction sites
- Food handling
- Washing facilities
- Eating and drinking areas
- Vermin control
- Change rooms

Appendix A presents a construction jobsite sanitation plan and checklist per the above provisions.

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6.2.3 Facility Sanitation Requirements

Sanitation at facilities must also be properly managed and effectively integrated with the facility's activities. The components of a facility's sanitation plan should include provisions for:

- Housekeeping
- Waste disposal
- Vermin control
- Toilet facilities
- Washing facilities
- Showers (as applicable)
- Change rooms (as applicable)
- Food and beverage consumption

NCDOT does not have clothes drying equipment at its facilities. Therefore, any cleaning of NCDOT supplied clothing is performed by contract.

Appendix B presents additional details for a facility's sanitation plan.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of supplies and equipment to maintain a safe and healthy workplace. Managers/Unit Heads will obtain and coordinate the required training for employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

Managers/Unit Heads will ensure that adequate supplies are available.

6.3.2 Supervisors

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will audit for compliance with this safety policy and procedure during their Facility and Jobsite Audits.

Supervisors will ensure that assembly rooms, toilets, and office spaces are maintained in an orderly manner.

SAFETY POLICY & PROCEDURE

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Each employee is responsible for maintaining NCDOT facilities in an orderly manner. Receptacles shall be used and waste disposed of properly. Spills, mud, and asphalt on footwear shall be removed promptly to prevent stains. Employees shall adhere to correct housekeeping and personal cleanliness in the performance of their job duties.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased sanitation supplies and equipment comply with this safety policy and procedure and current safety regulations.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

SAFETY POLICY & PROCEDURE

APPENDIX A: Construction Jobsite Sanitation Plan and Checklist

Jobsite:_____ Location:_____ Date:_____
Name:_____ Job Title_____

Potable Water

An adequate supply of potable water shall be provided. Portable containers that are used to dispense drinking water shall be capable of being tightly closed, equipped with a tap, clearly marked and not used for any other purpose. The common drinking cup is prohibited. (Water shall not be dipped from containers.)

YES NO

☐☐

Do all the portable containers have tightly closed lids? If not, replace non-tightly closed containers.

☐☐

Are all portable containers equipped with taps? If not, replace with tap equipped containers.

☐☐

Are containers clearly marked? If not, mark containers.

☐☐

Is there a sanitary dispenser for the single service cups? If not, obtain sanitary dispenser.

☐☐

Is there a receptacle for the disposal of the used single service? If not, obtain receptacle.

SAFETY POLICY & PROCEDURE

APPENDIX A: Construction Jobsite Sanitation Plan and Checklist (Continued) 2

Nonpotable Water

Nonpotable waters shall be identified by signs to indicate that the water is unsafe and is not to be used for drinking, washing, or cooking purposes. Nonpotable water trucks shall also be clearly marked and identified. Additionally, there shall be no cross-connection between systems furnishing potable and non-potable water.

YES NO

☐☐

Are all non-potable containers and trucks clearly marked and identified? If not, mark containers and trucks.

☐☐

Are back flow prevention devices installed to prevent back flow or back siphonage into a potable water system?

Toilets

YES NO

☐☐

Does the construction crew have readily available access to nearby toilet facilities? If no, toilets shall be provided for employees per the following:

Number of Employees

20 or less

21 - 199

200 or more

Minimum Number of Toilet Facilities

1

1 toilet seat and 1 urinal per 40 workers

1 toilet seat and 1 urinal per 50 workers

YES NO

☐☐

Is the project jobsite temporary? If yes, at least one toilet facility shall be made available.

☐☐

Does the jobsite have access to a sanitary sewer? If no, then portable chemical toilets (e.g., "Porta Johns") shall be made available.

APPENDIX A: Construction Jobsite Sanitation Plan and Checklist (Continued) 3

Food Handling

YES **NO**
☐ ☐

Are food handling service facilities onsite? If yes, ensure:

- All applicable laws, ordinances, and regulations of the local jurisdiction are met
- Food service facilities are operated with sound hygiene practices
- Dispensed food is wholesome, free from spoilage, and protected against contamination

Washing Facilities

YES **NO**
☐ ☐

Are employees engaged in the application of paints, coatings, herbicides, insecticides, or in other operations where contaminants may be harmful? If yes, and employees are not a mobile construction crew with transportation readily available to nearby washing facilities, then the following requirements are applicable:

- Lavatories with:
 - Hot and cold running water
 - Hand soap or similar cleansing agents
 - Individual cloth or paper hand towels, air blowers, or clean section of continuous cloth toweling
- Showers (if provided) will:
 - Be provided for each 10 employees of each sex
 - Have body soap or similar cleansing agents
 - Have hot and cold water feeding a common discharge line
 - Have individual clean towels

Eating and Drinking Areas

Ensure employees are not allowed to consume food or beverages in the toilet facilities or in any area exposed to toxic materials.

SAFETY POLICY & PROCEDURE

APPENDIX A: Construction Jobsite Sanitation Plan and Checklist (Continued) 4

Vermin Control

Every enclosed workplace shall be constructed and maintained to prevent the entrance or harborage or rodents, insects, and other vermin.

Change Rooms

YES **NO**
☐ ☐

Are employees required to wear protective clothing because of the possibility of contamination with toxic materials? If yes, change rooms shall:

- Be equipped with storage facilities for street clothes
- Be equipped with separate storage facilities for the protective clothing

APPENDIX B: Facility Sanitation Requirements

Housekeeping

- All places of employment are to be kept clean.
- Floors in work areas are to be maintained in a dry condition. Where wet processes are used, drainage shall be maintained and false floors, platforms, mats, or other dry standing places shall be provided, where practical, or appropriate waterproof footgear shall be provided.
- Every floor, working place and passageway shall be kept free from protruding nails, splinters, loose boards, and unnecessary holes and openings.

Waste Disposal

- Any waste receptacle used for decaying solid or liquid waste or refuse shall be so constructed that it does not leak and may be thoroughly cleaned and maintained in a sanitary condition. Such a receptacle shall be equipped with a solid tight-fitting cover, unless it can be maintained in a sanitary condition without a cover.
- All sweepings, solid or liquid wastes, refuse and garbage shall be removed in such a manner as to avoid creating a menace to health and as often as necessary or appropriate.

Vermin Control

- Every enclosed workplace shall be constructed, equipped, and maintained to prevent the entrance of and harboring of rodents, insects and other vermin.
- A continuing and effective extermination program shall be instituted where the presence of vermin are detected.

Water Supply

- Potable water shall be provided in all places of employment for drinking, washing of the person, cooking, washing of foods, washing of cooking or eating utensils, washing of food preparation or processing premises and personal service rooms.
- Portable drinking water dispensers shall be designed, constructed, and serviced so that they shall be capable of being closed and shall be equipped with a tap. Open containers for drinking water from which water must be dipped or poured are prohibited.
- A common drinking cup and other common utensils are prohibited.

APPENDIX B: Facility Sanitation Requirements (Continued) 2

Toilet Facilities

- Toilet facilities, in toilet rooms separate for each sex, shall be provided per the following:

<u>Number of Employees</u>	<u>Minimum Number of Water Closets</u>
1 to 15	1
16 to 35	2
36 to 55	3
56 to 80	4
81 to 110	5
111 to 150	6
Over 150	1 additional fixture for each additional additional 40 employees

Where toilet facilities will not be used by women, urinals may be provided instead of water closets. However, the number of water closets in those cases shall not be reduced to less than two-thirds of the minimum specified.

- Where toilet rooms will be occupied by no more than one person at a time and can be locked from the inside and contain at least one water closet, then separate toilet rooms for each sex need not be provided.
- The sewage disposal method shall not endanger the health of employees.
- Each water closet shall occupy a separate compartment with a door and walls or partitions between fixtures sufficiently high to assure privacy.

Washing Facilities

- Lavatories are to be made available in all places of employment.
- Each lavatory shall be provided with hot and cold running water.
- Individual hand towels of cloth or paper, warm air blowers, or clean individual sections of continuous cloth toweling convenient to the lavatories shall be provided.

Showers

- Whenever showers are required, one shower shall be provided for each 10 employees of each sex.
- Body soap or other appropriate cleaning agents convenient to the shower shall be provided.
- Showers shall be provided with hot and cold running water feeding a common discharge line.
- Employees who use showers shall be provided with individual clean towels.

APPENDIX B: Facility Sanitation Requirements (Continued) 3

Change Rooms

Whenever employees are required by a particular OSHA standard or agency guideline to wear protective clothing because of the possibility of contamination with hazardous materials, change rooms equipped with storage facilities for street clothes and separate storage facilities for the protective clothing shall be provided.

Consumption of Food and Beverage on Premises

- No employee shall be allowed to consume food or beverage in a toilet room nor in any area exposed to toxic material or infectious agents.
- Disposal containers constructed of smooth, corrosive resistant, easily cleanable or disposable material shall be provided and used for the disposal of waste food.
 - Number, size and location of such receptacles shall encourage their use and not result in overfilling.
 - They shall be emptied not less frequently than once each working day, unless unused, and shall be maintained in a clean and sanitary condition.
 - They shall be provided with solid tight-fitting covers unless sanitary conditions can be maintained without use of a cover.
- No food or beverage shall be stored in toilet rooms or in areas exposed to a toxic material or infectious agents
- In all places of employment where all or part of the food service is provided, the food dispensed shall be wholesome, free from spoilage, and shall be processed, prepared, handled and stored in such a manner as to be protected from contamination.
 - All food service employees shall wear appropriate clean outer clothing such as caps, coats, aprons, etc., while on duty and shall observe proper personal hygiene. No employee shall use tobacco in any form while engaged in the preparation and handling of food.
 - The hands of all employees handling food, utensils or equipment shall be kept clean and shall be washed before beginning work and after each visit to the toilet.
 - No person who has a contagious or infectious disease shall be allowed to work in food service.
 - Persons handling money should always wash hands prior to handling food or should use disposable gloves.

Unsafe Conditions

SPP# 1910.002

Quick Reference

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1.0 Purpose

The purpose of this safety policy and procedure is to establish the methods and accountability for the identification, avoidance, and elimination of unsafe and/or hazardous conditions in the workplace.

2.0 Scope and Applicability

This safety policy and procedure provides guidelines to assist all employees of the North Carolina Department of Transportation (NCDOT) to identify unsafe conditions which may exist in the workplace. This procedure also details the area of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects all NCDOT employees.

3.0 Reference

This safety policy and procedure is established in accordance with the Occupational Safety and Health Act of 1970.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT employees will be trained to recognize unsafe conditions and hazards related to their job duties. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Unsafe Conditions will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

SAFETY POLICY & PROCEDURE

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's policy on Unsafe Conditions. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor and to make all efforts to avoid accidents and injuries. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT'S safety policy and procedure on Unsafe Conditions.

6.1 Training

It will be the responsibility of Safety and Loss Control to support development of safety training programs for all NCDOT activities. Furthermore, Safety and Loss Control will be responsible for performing safety audits, safety design, and technical compliance guidance.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of required resources to eliminate unsafe conditions in their areas. Managers/Unit Heads will obtain and coordinate the required training for their employees.

Managers/Unit Heads will also ensure compliance through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any unsafe tasks or activities associated with his or her job.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are provided with PPE as necessary for their job.

SAFETY POLICY & PROCEDURE

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to manager/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased equipment complies with current safety regulations and this safety policy and procedure.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Flammable and Combustible Liquids**SPP# 1910.106****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for North Carolina Department of Transportation (NCDOT) employees who handle flammable and combustible liquids.

2.0 Scope and Applicability

NCDOT uses flammable and combustible liquids in its everyday operations. Flammable and combustible liquids require careful handling. Mixing and using these liquids, smoking, and using electrical equipment around them add to the hazards.

This safety policy and procedure presents guidelines for the safe use, and storage of flammable and combustible liquids. It presents training provisions, a discussion on health hazards and on the flammable and combustible liquids classification system. Additionally, this safety policy and procedure presents information on the typical NCDOT uses of flammable and combustible liquids, storage requirements, and disposal details.

This document details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This safety policy and procedure affects NCDOT employees who are exposed to the hazards associated with flammable and combustible liquids.

SAFETY POLICY & PROCEDURE

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Administration for General Industry 29 CFR (1910.106) and Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.152).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, flammable and combustible liquids will always be handled in a careful manner to minimize fire and explosion hazards. When these hazards exist that cannot be eliminated, the engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE) and proper training regarding Flammable and Combustible Liquids will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Flammables and Combustible Liquids. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions and identifies responsibilities required by NCDOT's safety policy and procedure on Flammable and Combustible Liquids.

6.1 Definitions

Barrel

A container holding 42 U.S. gallons.

Boiling Point

The boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (p.s.i.a.) or, if boiling point is unavailable, the 10 percent point of a distillation may be used as the boiling point of a liquid.

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Closed Container

A container sealed by means of a lid or other device such that neither liquid nor vapor will escape at ordinary temperatures.

Fire Area

An area of a building separated from the remainder of the building by construction which has a fire resistance of at least 1 hour and having communicating openings properly protected by an assembly which has a fire resistance of at least 1 hour.

Flashpoint

The minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

Liquid

Any material which has a fluidity greater than that of 300 penetration asphalt when tested which includes both flammable and combustible liquids.

Combustible Liquids

Any liquid having a flashpoint at or above 100°F. Combustibles are divided into two classes as follows:

- Class II Liquids will include those with flashpoints at or above 100°F and below 140°F or higher, except any mixture having components with flashpoints of 200°F or higher, the volume of which make up 99 percent or more of the total volume of the mixture.
- Class III Liquids will include those with flashpoints at or above 140°F. and below 200°F., except any mixture having components with flashpoints of 200°F or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.
- Class IIIB Liquids will include those with flashpoints at or above 200°F.

Flammable Liquids

Any liquid having a flashpoint below 100°F except a mixture having components with flashpoints of 100°F, or higher, the total of which make up 99 percent or more of the total volume of the mixture. Flammable Liquids are divided into three classes as follows:

- Class 1A include liquids having flashpoints below 73°F and having a boiling point below 100°F.
- Class 1B include liquids having flashpoints below 73°F and having boiling points at or above 100°F.
- Class 1C include liquids having flashpoints at or above 73°F and having boiling points below 100°F.

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Unstable Liquid

A liquid which in a pure state or as commercially produced or transported will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure, or temperature.

Portable Tank

A closed container having a liquid capacity over 60 U.S. gallons and not intended for fixed installation.

Pressure Vessel

A storage tank or vessel which has been designed to operate at pressures above 15 p.s.i.g.

Protection From Exposure

Adequate fire protection for structures on property adjacent to tanks, where there are employees of the establishment.

Safety Can

An approved container of not more than 5 gallons capacity, having a spring-closing lid and spout cover and so designed that it will relieve internal pressure when subjected to fire exposure.

Vapor Pressure

The pressure measured in pounds per square inch (absolute) exerted by a volatile liquid as determined by the “Standard Method of Test for Vapor Pressure of Petroleum Products.”

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Health Hazards
- Classification
- General Safety Requirements
- Uses
- Storage
- Disposal

6.2.1 Training

Employees who work with flammable and combustible liquids will be trained at the time of initial employment or assignment. Refresher training shall be provided at the discretion of the supervisor.

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6.2.2 Health Hazards

Flammable and combustible liquids create health hazards when inhaled or when they contact skin. Intoxication and other acute and chronic conditions may result from breathing vapors of flammable liquids. Irritation results from the solvent action that these liquids have on the skin's natural oils and tissue.

Vapors from flammable and combustible liquids are generally heavier than air. They will flow into pits, tank openings, confined areas, and low places where they may displace oxygen and contaminate the normal air, causing toxic and explosive atmospheres.

Oxygen deficiency may also occur in closed containers, such as a tank that has been closed for a long time and in which rusting has consumed the oxygen. Confined spaces should be tested for toxic and flammable atmosphere and oxygen levels. See [SPP #1910.146, Confined Space Entry](#), for additional details.

6.2.3 Classification

The National Fire Protection Association (NFPA) developed a classification system for flammable liquids and combustible liquids that uses flash point, vapor pressure and anticipated ambient temperature conditions.

The flash point of a liquid is the lowest temperature at which the vapor pressure of the liquid is just sufficient to produce a flammable mixture at the lower limit of flammability.

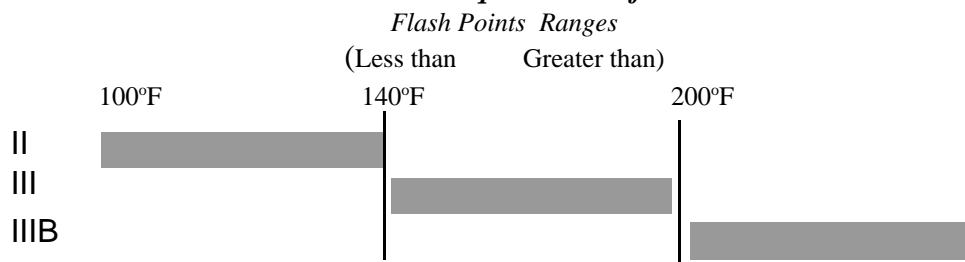
Vapor pressure is a property of a liquid in a closed container. The atmosphere above the liquid is a mixture of air and vapors of the liquid.

The temperatures at which the flash point and boiling point occurs also is used to determine the NFPA classification of a liquid. The following charts illustrate the classification of liquids based upon flash and boiling points.

Flammable Liquids Classification				
<i>Flash Points Ranges</i>			<i>Boiling Point Range</i>	
	(Less than	Greater than)	(Less than	Greater than)
	73°F	100°F	100°F	
IA			and	
IB			and	
IC			and	

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Combustible Liquids Classification



6.2.4 General Safety Requirements

Flammable and combustible liquids require careful handling. General safety requirements to minimize flammable and combustible liquids hazards include:

- Preventing dangerous mixtures
- Not smoking
- Avoiding static electricity

Preventing dangerous mixtures of flammable and combustible liquids is important to minimize fire and explosion hazards. Identify fill openings, discharge openings, and control valves on equipment containing flammable and combustible liquids by colors or labels, or both. Mark each tank with the name of the product or otherwise identify it. Keep lines from tanks of different types and classes of products separated.

Use a portable approved container for handling flammable liquids in quantities up to 5 gallons. Clearly identify the containers with lettering or a color code.

Not smoking in a building or area where flammable and combustible liquids are stored, handled, or used minimizes fire and explosion hazards. Employees should not smoke or carry strike-anywhere matches, lighters, and other spark-producing devices when inside a flammable and combustible liquid storage building. The size of the restricted area will depend on the type of products handled, the design of the building, local codes, and local conditions. *No Smoking* (see figure 1) signs must be conspicuously posted in buildings and areas where smoking is prohibited.



Figure 1

Avoiding static electricity minimizes fire and explosion hazards caused by spark discharges. Static electricity is generated by the contact and separation of dissimilar material. For example, static electricity is generated when a fluid flows through a pipe or from an opening into a tank.

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A static spark poses great danger where a flammable vapor may be present in the air, such as at the outlet of a flammable liquid's container, and around a tank truck's fill opening or barrel bunghole. When a difference in electrical potential is present, a spark between two bodies can occur because there is not a good electrical-conductive path between them.

To prevent static electricity, bonding and grounding of flammable and combustible containers must be done. Bonding eliminates the static charge potential between two or more containers. Grounding eliminates the static difference between a container and the earth.

Bonding and grounding do not eliminate static charges. Bonding equalizes the potential between two containers so that a spark will not occur between them. Grounding will discharge a charged conductive container.

Figure 2 presents how two containers should be bonded during the filling process. Figure 3 illustrates how electrical charges can build up in piping with recommended locations of the bonding wire at a truck loading/unloading facility. Figure 4 illustrates the use of a filter to dissipate electrical charges at a truck loading facility. Figure 5 presents a grounding configuration for aboveground storage tanks.

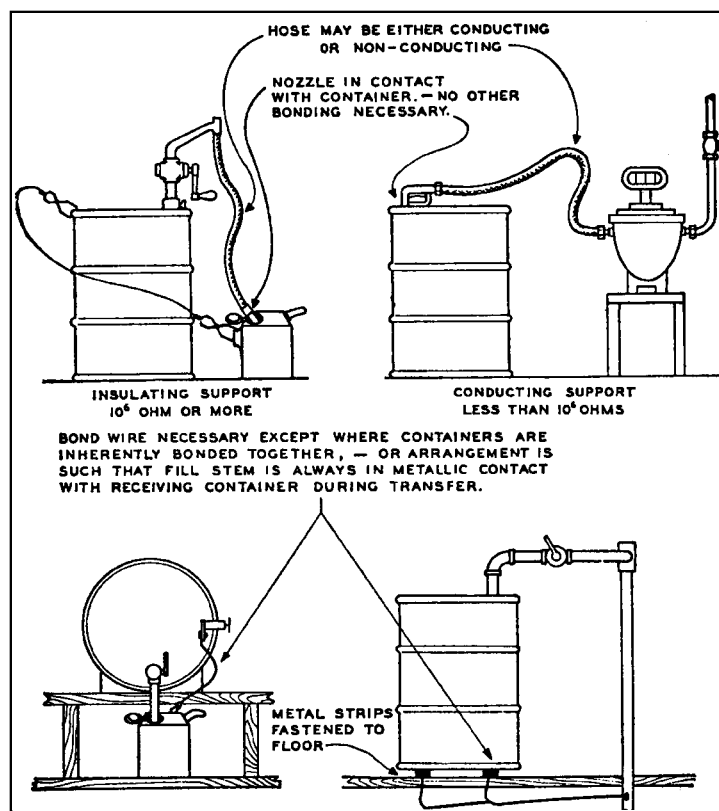


Figure 2

SAFETY POLICY & PROCEDURE

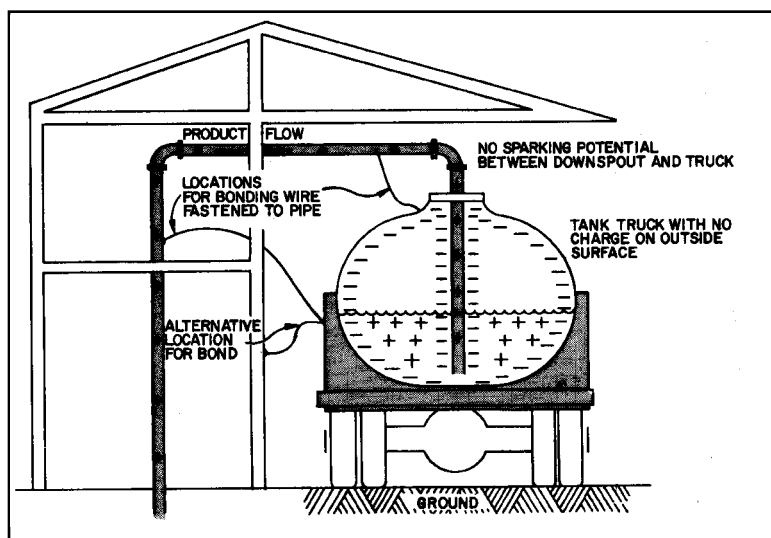


Figure 3

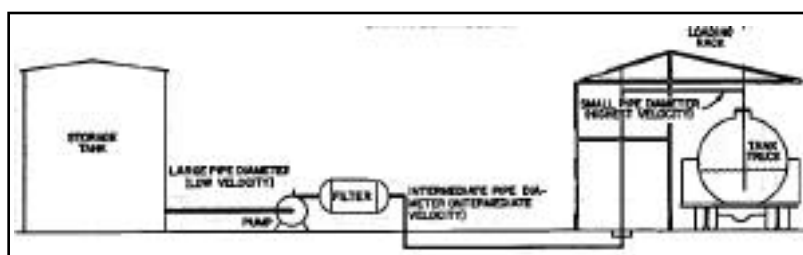


Figure 4

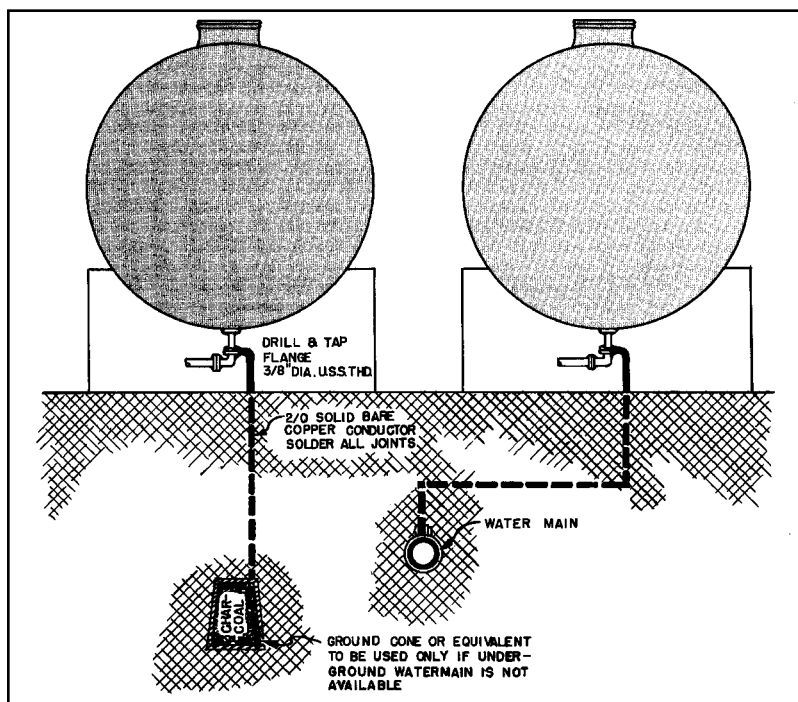


Figure 5

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6.2.5 Uses

Flammable and combustible liquids are used in a variety of applications in NCDOT. Common uses include:

- Dip tanks
- Drying ovens
- Oil burners
- Cleaning metal parts
- Internal combustion engines
- Spray booths
- Liquefied petroleum gases

When employees use these liquids, they should know and follow the necessary precautions with any of the uses of flammable and combustible liquids. (It should be noted that gasoline should never be used for cleaning parts or starting fires.) Appendix A presents a list of common flammable and combustible liquids used in NCDOT.

6.2.6 Storage

Storage requirements for flammable and combustible liquids are based on the storage quantity. The table on the following page presents general storage requirements based on capacity.

Flammable and combustible liquids can be stored in a variety of configurations depending upon capacity, use, storage configurations and classification. They include:

- Indoor storage areas
- Outdoor storage cabinets
- Outdoor storage
- Container and portable tank storage
- Fixed tank storage

Indoor storage areas are those areas where the primary function is to store liquids. This includes inside rooms, cut-off rooms, attached buildings, liquid warehouses, and hazardous material storage lockers. These storage areas should be constructed to be fire-resistant per NFPA 30. Additional construction requirements for storage areas are based on the classifications of the stored liquids and whether or not these liquids are dispensed.

Outdoor storage cabinets are used to store not more than 120 gallons of Class I, Class II, or Class III liquids. Storage cabinets are designed and constructed to limit the internal temperature at the center of the cabinet. These cabinets can be constructed of either metal or wood and must be marked, "FLAMMABLE-KEEP FIRE AWAY."

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Storage Capacity	Storage Container
Less than 60 gallons	Drums or other containers
Greater than 60, less than 660 gallons	Portable tanks
Greater than 660 gallons	Aboveground tanks, underground tanks, inside storage of fixed, and portable tanks

Outdoor storage of liquids in containers and portable tanks is permissible in either piles or racks. Appendix B presents outdoor storage requirements for liquids in containers and portable tanks. See NFPA 30 for additional details.

Container and portable tank storage should be used for the storage of liquids that do not exceed 60 gallons (containers) and 660 gallons (portable tanks). Appendix C presents the maximum allowable container sizes by classification.

Fixed tank storage of liquids is applicable to capacities greater than 660 gallons and includes the following tank configurations:

- Aboveground
- Underground
- Inside storage of liquids in fixed and portable tanks (Storage tank buildings)

Appendix D presents fixed tank installation criteria for all the above fixed tank configurations.

6.2.7 Disposal

If uncontaminated flammable and combustible liquids are not to be used they can be:

- Returned to the vendor
- Salvaged for resale
- Used in some other approved way

If recycling or recovery of used or dirty flammable and combustible liquids is not feasible, then it should be handled by a licensed disposal contractor. Used flammable and combustible liquids are never to be disposed of into the earth or into any water bodies.

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6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of equipment and supplies to aid in the safe use and storage of flammable and combustible liquids. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that employees will not handle flammable and combustible liquids until they have been trained. They will also identify those areas through their facility and jobsite audits that have improper flammable and combustible liquid storage.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure. They are also to report immediately to their supervisor any hazardous or unsafe condition regarding flammable and combustible liquids' use and storage.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

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APPENDIX A: List of Common Flammable and Combustible Liquids Used in NCDOT

Common Name	Flash Point (Degrees F)
Acetic Acid	109
Acetic Anahydride	129
Acetone	0
Acetylene	Gas
Adhesives, Commercial Type-	- 5 to 60
Adhesives and Sealers	>20
Aniline Hydrochloride	380
Anti-freeze	232
Asphalt, Cutback	50
Asphalt, Liquid (Grade MC30 and MC70)	100
Asphalt, Liquid, Medium Cure	150
Asphalt, Liquid, Rapid Cure	50
Asphalt, Liquid (Grade SC-70)	150
Asphalt, Liquid, Slow Cure (Grade SC-250)	175
Asphalt, Liquid, (Grade SC-800)	200
Asphalt, Liquid, (Grade SC-3000)	225
Asphalt, typical (Petroleum pitch or tar)	400
Benzene	12
Benzine (Petroleum Ether)	<0
Butane	Gas
Butyl Alcohol	84
Butyl Phthalyl Butyl Glycolate	390
Car Undercoating	>50
Carbon Monoxide	Gas
Carburetor Cleaners	>70
Cleaning 'Safety' Solvent	>105
Denatured Alcohol	60
Diesel Fuel No. 1-D	100
Diesel Fuel No. 2-D	125
Diesel Starting Fluid - See Ethyl Ether	
Diphenylamine	307
Duplicating (printing) fluids	>50
Electrostatic Toner	>110
Epoxy Catalysts (hardeners)	80
Epoxy Resins	>35 (most above 300)
Epoxy Thinner (solvents)	>50
Ethyl Alcohol	55
Ethyl Chloride	-58
Ethyl ether	-49

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APPENDIX A: List of Common Flammable and Combustible Liquids Used in NCDOT (Cont'd) 2

Common Name	Flash Point (Degrees F)
Formic Acid (90% solution)	122
Fuel Oil (Fuel Oil No.2)	100
Gasoline	-45
Glycerine	320
Herbicides (Weed Killers)	>85
Hydrogen Sulfide	Gas
Insecticides (Insect Killer)	> 80
Isobutyl Alcohol	82
Isopropyl Alcohol (Propanol)	53
Kerosene (Fuel Oil No. 1)	100
Methyl Alcohol (Methanol)	52
Methane	Gas
Methyl Ethyl Ketone	21
Naphtha, coal tar type	107
Naphtha, petroleum	< 1
Naphtha, VM&P, 50 ⁰ F Flash	50
Naphtha, VM&P, High Flash	80
Naphtha, VM&P, Regular	28
Nitrobenzine	190
Oleic Acid	372
Paint, Enamel	>50
Paint, Epoxy (coating)	60
Paint, Lacquer	10 to 40
Paint and Varnish Removers	>20
Primers, Paint (coatings)	>40
Propane	Gas
Rust Preventive Coating	>100
Salicyclic Acid	315
Spray Lubricant (WD-40, etc.)	> 90
Tartaric Acid	410
Thinners, Enamel	0 to 150 (40 common)
Thinners, Lacquer	0 to 100 (40 common)
Toluene	40
Type and Office Machine Cleaners	40
Waxes	>100
Window Cleaner	>90
Windshield Washer	>50
Xylene	81

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APPENDIX A: List of Common Flammable and Combustible Liquids Used in NCDOT (Cont'd)3

Special notes on selected flammable and combustible liquids.

Ammonium Nitrate - Ignites when mixed with acetic acid. May react violently or explode with powdered metals.

Ammonium Persulfate - May explode when mixed with aluminum powder. Will explode with sodium peroxide if subjected to crushing (or heating or if a stream of CO² is passed over it).

Magnesium Nitrate - Oxidant. In contact with easily oxidizable substances may ignite or explode.

Mercuric Nitrate - May explode when heated to decomposition.

Perchloric Acid - Strong oxidant. May explode on contact with organic materials.

Potassium Bromate - Strong oxidant. May react with many substances and cause ignition of combustible materials.

Potassium Chloride - Powerful oxidizing material. May form explosive mixture with easily oxidizable material.

Potassium Nitrate - Oxidizing material. In contact with easily oxidizable material may cause combustion or explosion.

Silver Nitrate - Oxidizing material. Increasing flammability of other oxidizing materials.

Sodium Nitrite - Oxidizing agent. If in contact with easily oxidizable substances, combustion or explosion may result.

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APPENDIX B: Outdoor Liquid Storage Requirements

Outdoor Liquid Storage in Containers

Class	Container Storage -Max per Pile in Gallons	Container Storage -Max per Pile in Height (Ft)	Distance Between Piles or Racks (Ft)	Distance to Property Line that Is or Can Be Built Upon	Distance to Street, Alley, or Public Way
IA	1,100	10	5	50	10
IB	2,200	12	5	50	10
IC	4,400	12	5	50	10
II	8,800	12	5	25	5
III	22,000	18	5	10	5

Outdoor Liquid Storage in Portable Tanks

Class	Portable Tank Storage -Max per Pile in Gallons	Portable Tank Storage -Max per Pile in Height (Ft)	Distance Between Piles or Racks (Ft)	Distance to Property Line that Is or Can Be Built Upon	Distance to Street, Alley, or Public Way
IA	2,200	7	5	50	10
IB	4,400	14	5	50	10
IC	8,800	14	5	50	10
II	17,600	14	5	25	5
III	44,000	14	5	10	5

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APPENDIX C: Maximum Container and Portable Tank Sizes by Classification

Container Type	Flammable Liquids			Combustible Liquids	
	Class IA	Class IB	Class IC	Class II	Class III
Glass	1 pint	1 quart	1 gallon	1 gallon	5 gallons
Metal	1 pint	5 gallons	5 gallons	5 gallons	5 gallons
Approved Plastic	1 pint	5 gallons	5 gallons	5 gallons	5 gallons
Safety Cans	2 gallons	5 gallons	5 gallons	5 gallons	5 gallons
Metal Drum	60 gallons	60 gallons	60 gallons	60 gallons	60 gallons
Metal Portable Tanks	660 gallons	660 gallons	660 gallons	660 gallons	660 gallons
Polyethylene Fibre Drum	1 gallon	5 gallon	5 gallons	60 gallons	60 gallons
				60 gallons	60 gallons

APPENDIX D: Fixed Tank Installation Criteria

There are several criteria associated with fixed tank installations. In all of these installations, NFPA 30 should be consulted for further details.

Aboveground storage tanks should meet several criteria in its installation. These criteria include:

- Location
- Spacing
- Control of spillage
- Remote impounding
- Venting
- Emergency relief venting
- Tank openings other than vents
- Abandonment
- Foundations and supports

Underground storage tanks should meet several criteria in their installation. These criteria include:

- Location
- Burial depth and cover
- Corrosion protection
- Vents
- Tank openings other than vents
- Abandonment
- Foundations and supports

Storage tank buildings should also meet several criteria in their installation. These criteria include:

- Location
- Construction
- Ventilation
- Drainage
- Vents
- Tank openings other than vents
- Electrical equipment provisions
- Fire prevention and control measures
- Foundations and supports

Additionally, for areas subject to flooding, more specific provisions are required for all tank storage configurations.

Explosives

SPP#1910.109

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1.0 Purpose

The purpose of this safety policy and procedure is to establish the guidelines and procedures through which North Carolina Department of Transportation (NCDOT) employees have the training and proper equipment when working with or in close proximity to explosives or blasting operations.

2.0 Scope and Applicability

Certain operations in NCDOT may require the use of explosives and may include:

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- Secondary road construction
- Beaverdam demolitions
- Boulder and large rock removals
- Old bridge removals

Explosives use within NCDOT is a vital part of construction operations; however, tragic consequences can result from the unauthorized use or misuse of explosives. Therefore, this safety policy and procedure provides guidelines for safe handling and use of explosives by NCDOT employees.

This safety policy and procedure includes provisions for training and discussion of qualifications for explosives specialists. Discussion is presented on the type of explosives used in NCDOT, the minimum equipment required to initiate explosives, electric blasting precautions around radio frequencies, and how to obtain explosives equipment. It includes explosives storage and label, signs, and marking requirements. Additionally, discussion is presented on transportation, security, and recordkeeping requirements.

This document details the areas of responsibility for managers/unit heads, supervisors, employees, Explosive Specialists, and Safety and Loss Control within NCDOT.

This policy affects all NCDOT Explosives Specialists, Drillers, Handlers, Explosives Conveyance Operators, Machine Operators, and other employees who, through the performance of their duties, may be exposed to hazards involving the storage, transport, handling or use of explosives.

3.0 References

This safety policy and procedure is established in accordance with Occupational Safety and Health Administration for General Industry (29 CFR 1910.109), Occupational Safety and Health Administration for the Construction Industry (29 CFR 1926.902), US Department of Transportation Regulations (49 CFR Part 170 - 178), US Department of the Treasury, BATF Regulations (27 CFR Part 55).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, unauthorized use of explosives is strictly prohibited and will not be tolerated. When explosives hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, and proper training regarding Explosives will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Explosives. It is also the responsibility of each NCDOT employee to report immediately any unsafe act to his or her supervisor. Specific responsibilities are outlined in Section 6.3.

6.0 Procedure

This section provides definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Explosives.

6.1 Definitions

ANFO

A blasting agent consisting of a mixture of ammonium nitrate and fuel oil.

Binary Explosive

Explosives that consist of two or more unmixed, commercially manufactured, prepackaged chemicals, including oxidizing chemicals, flammable liquids, or solids that are not independently classified as explosives. When combined, however, the mixture is classified as an explosive and is stored, transported, and handled as an explosive.

Blaster's Galvanometer

An instrument used to measure the electrical resistance of detonators (EB caps) and circuits.

Blasting Agents

Blasting agents are generally considered safer than Class A, B, or C explosives and yet, when properly initiated, they function in the same manner as Class A explosives. Not being cap sensitive, they require a strong primer. An example is Ammonium nitrate and fuel oil mixture (ANFO).

Blasting Cap

See Detonator below.

Booster Primer

An explosive charge, usually of high strength and high detonation velocity, used to improve the initiation of less sensitive explosives materials.

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Class A Explosives / Explosives 1.1

Possessing detonating hazards, such as dynamite, lead azide, nitroglycerin, picric acid, black powder, detonators (blasting caps), and detonating primers.

Class B Explosives / Explosives 1.3

Possessing flammable hazards, such as propellant explosives, including some smokeless propellants.

Class C Explosives / Explosives 1.4, 1.5, 1.6

Includes certain types of manufactured articles which contain Class A or Class B explosives, or both, as components but in restricted quantities. Includes blasting agents.

Detonator

Any device containing a detonating charge that is used for initiating detonation in an explosive. The term includes, but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use with a safety fuse, and detonating cord delay connectors.

Explosives

Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat.

Explosives Specialist

A trained qualified employee authorized to use, store, and transport explosives for NCDOT.

High Explosives

Explosives that are characterized by a very high rate of reaction, high pressure development, and the presence of a detonation wave in the explosive. Examples include dynamite, cap sensitive water gels, slurries, emulsions, and cast boosters.

IME

Institute of Makers of Explosives.

Low Explosives

Explosives that are characterized by deflagration or a low rate of reaction and the development of low pressure. Examples include black powder, safety fuse, igniters, igniter cords, and fuse lighters.

Magazine

Any building or structure, other than an explosives manufacturing building, used for the storage of explosives.

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Slurry Explosives

An explosives product containing substantial proportions of water and high properties of ammonium nitrate, some of which are in a solution of water.

Vehicle Attendance

A motor vehicle is attended when the person in charge of the vehicle is on the vehicle, awake, or is within 100 feet of the vehicle and has it within his unobstructed field of view.

Water Gels

A Class A Explosives comprised mainly of water and ammonium nitrate.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training Requirements
- Qualifications of Explosives Specialists
- Types of Explosives
- Minimum Equipment Required to Initiate Explosives
- Radio Frequency Hazards with Electric Blasting Caps
- Equipment Procurement
- Explosives Storage
- Label, Signs, and Marking Requirements
- Transportation of Explosives on NCDOT Equipment
- Security and Recordkeeping

6.2.1 Training Requirements

Safety and Loss Control will conduct comprehensive training and retraining annually on the safe storage, transport, handling, and use of explosive products. The New Explosives Specialists Certification Course will consist of 32 hours of classroom materials and field applications. The Recertification Course will consist of 16 hours of classroom materials. Emphasis will be placed on workshops and practical exercises in each course.

Comprehensive final examinations will be given to ensure each employee is capable of performing his job safely. Only those students passing the written examination and demonstrating proficiency in the practical applications will be certified or recertified as NCDOT Explosives Specialists. See Appendix A for details of the required instructional topics.

6.2.2 Qualifications Of Explosive Specialists

Explosives Specialists must successfully complete the Explosives Safety Course prior to performing their job duties. Those whose duties require

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involvement in the storage, handling, transport or use of explosives or those in direct supervision of these activities must successfully complete the explosives safety course prior to performing their job duties.

All individuals who successfully complete the training will receive a certificate. This certificate is valid for three years at which time recertification is necessary.

Employees who are not active in explosives work during the three year period must take the full course before being recertified.

6.2.3 Types of Explosives

Explosive materials may be divided into three classes:

- High Explosives
- Low Explosives
- Blasting Agents

High Explosives are explosive materials which can be caused to detonate by means of a blasting cap. Examples include dynamite, cap sensitive water gels, slurries, emulsions, and cast boosters.

Low Explosives are explosive materials which, when confined, can be caused to deflagrate. Examples include black powder, safety fuses, igniters, igniter cords, and fuse lighters.

Blasting Agents are substances classified by the U.S. Department of Transportation as blasting agents. Ammonium nitrate and fuel oil are examples.

The type of explosives products used in NCDOT blasting operations include:

- Water gel high explosives
- Binary Explosives
- Detonators (Blasting caps)
- Booster Primers
- Blasting Agents

Water gels are the primary type of high explosive used in NCDOT blasting operations. Water gels are comprised of water and high property ammonium nitrate. Nitroglycerin-based high explosive dynamites should not be ordered or used in NCDOT blasting operations. Water gels are considered safer and equally effective.

Two component (binary) explosives are recommended for small jobs that require only a few sticks of explosives. Binary explosives are also classified as high explosives once they are mixed.

Detonators (blasting caps) are used to initiate either a chemical or thermal reaction in the explosive by means of an electric or non-electric catalyst.

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Examples of some typical blasting caps are shown in Figure 1.

Booster Primers are high explosives used with detonators (blasting caps) to ensure complete detonation of water gel explosives. The initiation of water gel explosives is affected by temperature and shelf life. Therefore, NCDOT requires the use of booster primers on all electric and non-electric detonators (caps).



Figure 1

Pre-mixed ammonium nitrate and fuel oil (ANFO) is the blasting agent predominately used in NCDOT blasting operations and is available on state contract. Mixing your own blasting agents (i.e., ANFO) is strictly prohibited. The result can be hazardous and may not give the desired results. Also, there are severe penalties for manufacturing explosives without a license.

6.2.4 Minimum Equipment Required to Initiate Explosives

Two types of explosives initiation systems are used in NCDOT blasting operations. These two initiation systems are:

- Electric Initiation System
- Non-Electric (Shock Tube) Initiation

The minimum equipment required to initiate electrical and non-electrical blasting are detailed in Appendix B. Under no circumstances will an Explosives Specialist initiate blasting without the minimum equipment detailed in Appendix B. Failure to use the minimum equipment may result in incomplete blasting or create unsafe and dangerous conditions.

6.2.5 Extraneous Electricity Hazards with Electric Blasting Caps

Premature detonations of electric blasting caps are possible due to extraneous electricity entering the electric blasting circuit. Extraneous electricity can be introduced into an electric blasting circuit by either direct contact (e.g., stray currents and static electricity) or through the effect of electric and/or magnetic fields (e.g., inductive coupling, capacitive coupling, and electromagnetic or radio waves).

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Therefore, precautions shall be taken to prevent accidental discharge of electric blasting caps from stray ground current, static electricity, current induced by radar, radio transmitters, lighting, adjacent power lines, dust storms, or other sources of extraneous electricity. Appendix C details the required precautions against extraneous electricity.

6.2.6 Equipment Procurement

Equipment that is specific to blasting operations can be obtained through the normal inventory process. The explosives and explosives supply contract is updated bi-annually.

Non-sparking bed liners for vehicles can be obtained from the Central Equipment Unit on an as-needed basis.

Information on Type 2 portable magazines that meet IME 22 specifications can be obtained through Safety and Loss Control.

6.2.7 Explosives Storage

Proper storage prevents unauthorized access to explosives materials and reduces their deterioration. All explosives materials, including blasting agents, detonators, detonating cords, boosters, blasting caps, and electric and non-electric blasting caps should be stored in magazines.

There are three types of magazines used in NCDOT for the storage of explosives materials. These magazine types are Type 1, Type 2, and Type 3. Appendix D presents details on magazine types and explosives storage requirements by explosives class.

6.2.8 Labels, Signs, and Markings

Properties where Type 1 magazines are located and properties where Type 2 magazines are located outside buildings must be posted with signs reading: “EXPLOSIVES - KEEP OUT/OFF” as shown in Figure 2.

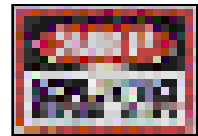


Figure 2

Ammonium nitrate storage bins or piles must be clearly identified by signs reading “AMMONIUM NITRATE” with letters at least 2 inches high.

6.2.9 Transportation of Explosives on NCDOT Equipment

Explosives transport shall meet several requirements to protect the life, health, and safety of the public and NCDOT employees. Appendices E and F detail these requirements.

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6.2.10 Security and Record Keeping

Strict security and record keeping requirements for inventory control, illegal entries into magazines, magazine security, and explosives activity are detailed in Appendix G.

6.3. Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that the necessary vehicles, equipment, test instruments, explosives products and supplies are budgeted for, acquired, and maintained in a state of readiness for use in explosives work.

Managers/Unit Heads will encourage supervisors of Explosives Specialists and blasting projects to successfully complete the Explosives Safety Course. Managers/Unit Heads are responsible for coordinating required training with the Safety and Loss Control.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process

6.3.2 Supervisors

Supervisors will ensure that all Explosives Specialists have the required training and certification prior to handling or using explosives. Supervisors will support Explosives Specialists through the provision of appropriate vehicles, equipment, supplies, materials, and competent manpower to ensure the safe and efficient use of explosives.

Supervisory personnel who supervise Explosives Specialists and their projects should successfully complete an Explosives Safety Course.

6.3.3 Employees

It is the responsibility of each employee to identify potential hazards associated with the storage, handling, transportation, and use of explosives. It is also the responsibility of each employee to refrain from work involving explosives without training specific to the hazards of the tasks involved and/or close supervision by the Explosives Specialist.

Employees are required to follow instructions by the trained Explosives Specialist in all matters of explosives work and explosives safety.

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6.3.4 Explosives Specialists

It is the responsibility of the Explosives Specialist to successfully complete the required Explosives Safety Course and possess a current Explosives Specialist certification card prior to handling, transporting, or using explosives. The Explosives Specialist also has responsibility to ensure training of employees who assist with work on their explosives projects in recognizing and avoiding hazards specific to the assigned tasks and to supervise the work of those employees. Additionally, the Explosives Specialist will always make the final decision on whether or not a shot can be safely fired.

Department of Corrections inmates are not permitted to handle any explosives. They may be permitted to work with the drilling, but must leave the shot area prior to live explosives being brought in.

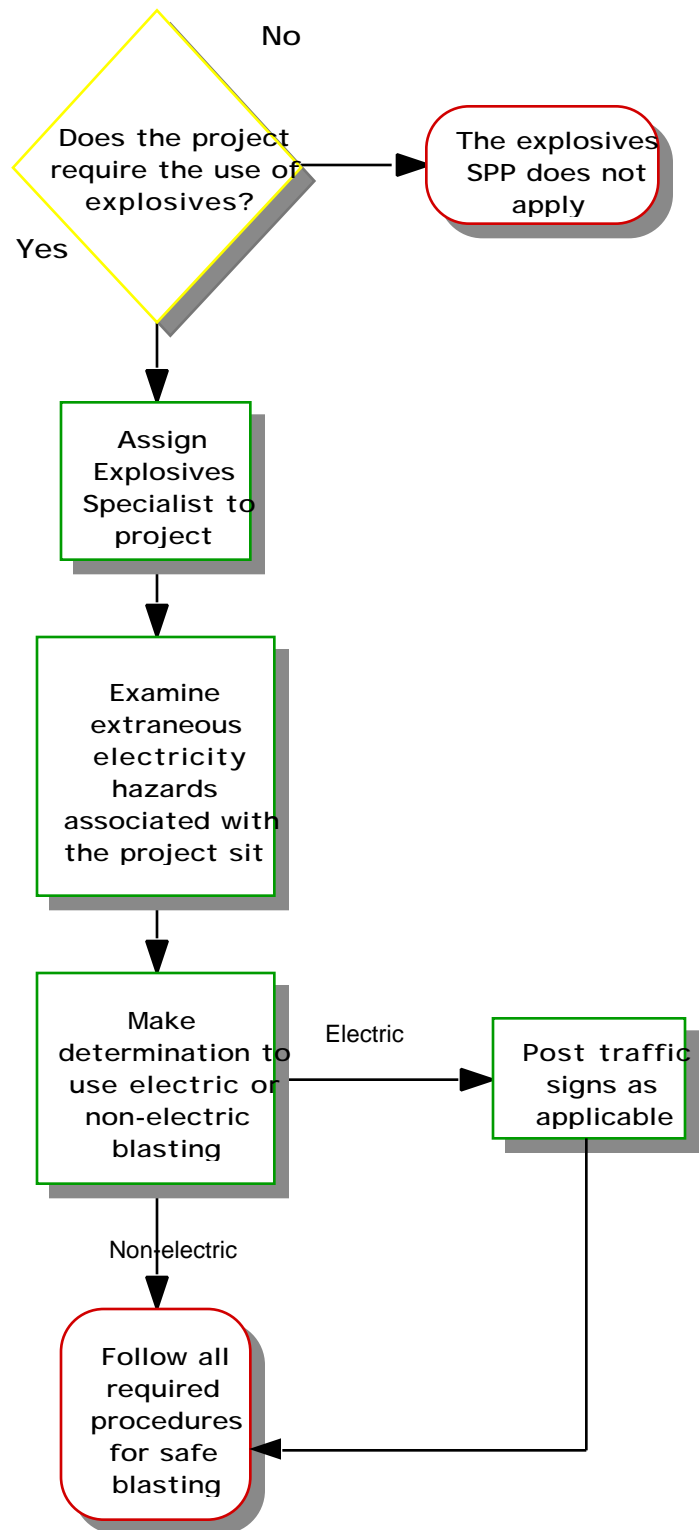
6.3.5 Safety and Loss Control

Safety and Loss Control is responsible for conducting explosives safety schools. Safety Engineers are responsible for ensuring that explosives safety training, explosives products, supplies, and related equipment that are made available to the Explosives Specialist are of the highest quality and are safe and appropriate for the work to be performed.

Safety Engineers will also make periodic explosives safety surveys to ensure safe practices are in use. Safety and Loss Control Safety Engineers may be used to evaluate shot plans, blasting sites, seismographic surveys, and electrical conditions that may present a hazard to blasting.

Safety Engineers will be available to NCDOT managers/unit heads, supervisors, Explosives Specialists, and affected employees for consultation in matters of blasting safety.

Explosives Flow Chart



APPENDIX A: Training Requirements and Required Publications

Explosives Training Requirements

Instruction will consist of the following topics:

- Definitions and Explosives Properties
- Explosives History and Types Of Explosives
- Basic Electricity
- Detonation Mechanisms
- Blasting Instruments
- Transportation of Explosives Material
- Electrical Hazards
- Fire Hazards
- Misfires
- Powder Factors and Variables Affecting Them, Placement of Boreholes
- Friction and Impact Detonations
- Fly Rock and Other Hazards
- Loading and Firing Methods
 - Electric Initiation of Explosives
 - Non-Electric Initiation of Explosives
- Storage, Security, and Recordkeeping
- Use of Check List and Shot Planning
- Policies, Standards, Rules, and Regulations

Sufficient employees must be trained to provide a NCDOT Certified Explosives Specialist for each worksite requiring the involvement of NCDOT employees in the storage, handling, transportation, or use of explosives.

Required Publications for Reading

In addition to successfully completing the Explosives Safety Course, Explosives Specialists must develop a working knowledge of the following publications:

- OSHA 29 CFR 1910.109
- OSHA 29 CFR 1926.902
- IME Publication No. 17, Safety in Transportation, Storage, Handling, and Use of Explosives
- NC Department of Labor Industry Guide #13 - A Guide to the Safe Storage of Explosives Products.
- NC Department of Labor Industry Guide #11 - A Guide to Protection Against Radio Frequency Hazards During the Use of Electric Blasting Caps (detonators)

APPENDIX B: Equipment Required for Electrically and Non-Electrically Initiated Blasting

Electrically Initiated Blasting

An Explosives Specialist will not engage in performing *electrically initiated blasting* without the following minimum equipment:

- Operational blaster's galvanometer
- Operational blasting machine with capacity adequate for the work to be performed (capacitive discharge [CD] blasting machine is preferable)
- Millisecond (ms) delay and instant electric detonators (eb caps)
- Two 500 foot lengths of 14 gauge blasters lead (firing) line (not duplex) with suitable lead line reels (wire must be solid copper, not stranded)
- Spool of 20 gauge connecting wire (wire must be solid copper, not stranded)
- Blaster's pliers and powder punch (non-sparking)
- A non-conductive tamp suitable in length
- A non-metallic measuring tape

Non-Electrically Initiated Blasting

An Explosives Specialist will not engage in performing *non-electrically (shock tube) initiated blasting* without the following minimum equipment:

- **Blaster's** shock tube initiating device
- Non-electric detonators (nonel caps or EZ-Dets)
- Shotgun primers (required for most shock tube initiators)
- 17 ms delay non-electric detonators (Primadet Primers)
- A minimum of 500 feet of non-electric lead in line (shock tube) for each shot to be fired
- Splice connectors
- **Blaster's** pliers and powder punch (non-sparking)
- A non-conductive tamp suitable in length
- A non-metallic measuring tape

APPENDIX C: Electric Blasting Precautions Around Extraneous Electricity

- Stray current is defined as current flow outside an insulated conductor system. It generally arises as a result of defective insulation on electrical power systems or on electrically operated equipment. Other sources of stray current include electrified fences, cathodic protection for underground pipelines, electric railway lines or any electric system that either accidentally or on purpose uses a ground return path. A stray current survey can be made at a blast site by a Safety Engineer if stray current sources are identified.
- Capacitive and inductive coupling refers to electrical energy that may be introduced into a blasting circuit by electric and magnetic fields, respectively, that are associated with a power line. If a blast site is in close proximity to high voltage power lines, precautions should be taken. Use non-electric initiation if possible.
- Detonators shall be short-circuited in holes which have been primed and shunted until wired into the blasting circuit.
- The prominent display of adequate signs, warning against the use of mobile radio transmitters, must be made on all roads within 1,000 feet of blasting operations. Whenever adherence to the 1,000 foot distance would create an operational handicap, a competent person shall be consulted to evaluate the particular situation, and alternative provisions may be made which are adequately designed to prevent any premature firing of electric blasting caps. Description of any such alternatives shall be made in writing by the competent person and shall be certified as preventing any premature firing of electric blasting caps. The description shall be maintained at the construction site during duration of the work, and shall be available for inspection by representatives of the NC Commissioner of Labor.
- Examples of blastings signs warning against the use of radios per the previous paragraph are shown in Figure 3.
- Mobile radio transmitters which are 100 feet or less from electric blasting caps, in other than original container, shall be de-energized and effectively locked.



Figure 3

APPENDIX D: Types of Magazines and Explosives Storage Requirements

Types of Magazines

There are three types of magazines used in NCDOT for the storage of explosives materials:

- *Type 1 magazines* are permanent magazines for the storage of high explosives. Other classes of explosives materials may also be stored in Type 1 magazines.
- *Type 2 magazines* are mobile or portable indoor and outdoor magazines for the storage of high explosives.
- *Type 3 magazines* are portable outdoor magazines for the temporary storage of high explosives while attended (a day box, for example)

Storage of Classes of Explosives Materials

In the following table, the classes of explosives materials are paired with types of magazines.

Storage of Classes of Explosives Materials by Magazine Type

Class of Explosives Materials	Magazine Type		
	1	2	3
High Explosives (dynamite; cap-sensitive water gels; slurries; emulsions; cast boosters)	•	•	•
Low Explosives (black powder)	•	•	•
Class A Detonators	•	•	•
Detonating Cords	•	•	•
Class C Detonators*	•	•	•
Safety Fuses, Electric Squibs, Ignitors, and Ignitor Cords	•	•	•
Blasting Agents	•	•	•

Note: Detonators must never be stored in the same magazine with other explosives.

****Includes electric detonators with leg wires 4 feet long or longer or detonators with empty plastic tubing 12 feet long or longer that contain not more than 1 gram explosives (excluding ignition and delay charges).***

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APPENDIX E: Transportation Requirements for Explosives

- Drivers transporting explosives over public highways must have a valid Commercial Drivers License (CDL) with a Hazardous Materials endorsement.
- Only authorized persons qualified in explosives handling and/or blasting operations are allowed in or around vehicles transporting explosives materials.
- Explosives, blasting detonators, and blasting agents will not be transported with tools, equipment, materials, or other cargo.
- Tools, equipment, and/or materials of non-hazardous nature can be carried in separate compartments as long as the hazards are not increased.
- No loose cargo will be permitted in the compartment with explosives.
- OSHA regulations prohibit the transportation of electric blasting detonators and other explosives on the same vehicle. However, same vehicle transportation is permissible if both items are packed in their original containers, properly labeled, and deposited in approved containers or compartments. See Appendix F for details on same vehicle transport for detonators and explosives.
- Explosives and/or blasting detonators will not be transported on trailers unless the trailers are specifically designed and/or equipped for explosives hauling or storage.
- Explosives A or Explosives 1.1 USDOT placards will be displayed on all four sides of a vehicle carrying any amount of Class A/ Class 1.1 as shown in Figure 4.



Figure 4

- Each vehicle used for the transportation of explosives will have two fully charged fire extinguishers in good condition not less than 10 ABC rating each. The driver shall be trained in the proper use of a fire extinguisher.
- Motor vehicles carrying explosives, detonators, or blasting agents will not be taken inside a garage or shop for repairs or servicing.
- No motor vehicle transporting explosives shall be left unattended.

SAFETY POLICY & PROCEDURE

APPENDIX F: Same Vehicle Transportation Requirements for Detonators and Explosives

Same vehicle transportation of detonators and other explosives is permissible if both items are packed in original, properly labeled, and approved containers or compartments. These containers or compartments shall conform to IME Safety Library Publication Number 22. Recommended vehicle locations are as follows:

- A portable approved container placed within and readily removable from the cargo-carrying space of the vehicle
- A container securely attached to the vehicle as is shown in Figure 5
- A compartment built into the cargo space of the vehicle as is shown in Figure 6
- The cab of the vehicle is not acceptable as the compartment or container in which the detonators shall be placed

Detailed construction requirements are outlined in IME Safety Library Publication 22. General construction requirements for the container or compartment shall be as shown in Figures 7 and 8 and as listed below:

- The metal surface of the cargo compartment shall be lined with non-sparking material and the vehicle shall have tight floors.
- Open body vehicles cargo areas shall be covered with a fire and moisture resistant tarpaulin or equivalent.
- Explosives shall not be piled higher than the sides or tailgate of the transporting vehicle.

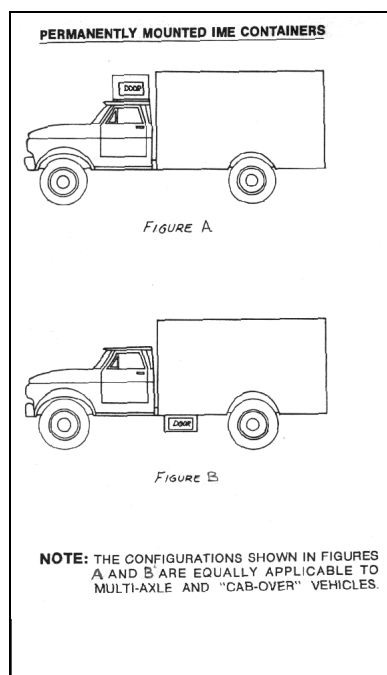


Figure 5

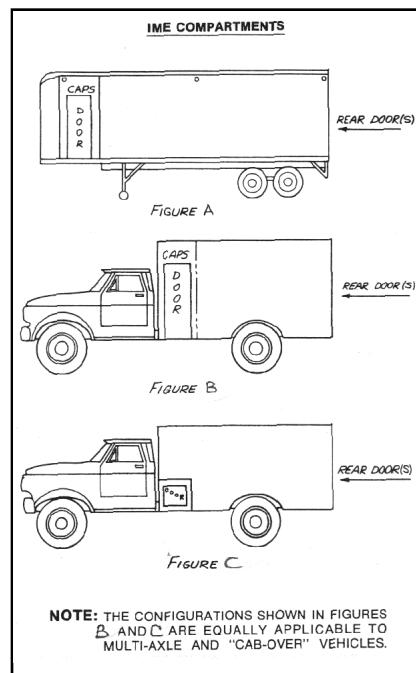


Figure 6

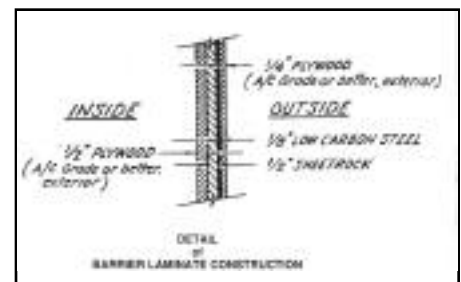


Figure 7: 1/2" Inside Plywood

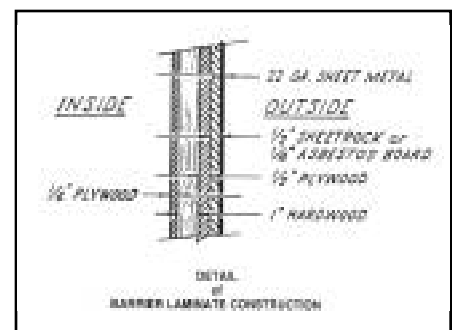


Figure 8: 1/4" Inside Plywood

APPENDIX G: Security and Record keeping Requirements for Explosives

- All magazines should be checked for illegal entry at least every three days. Any illegal entry, theft or loss of explosives must be reported within 24 hours to:
 - US Treasury Department, Alcohol, Tobacco and Firearms Division
1-800-800-3855
 - North Carolina Department of Transportation, Safety and Loss Control
 - Local Law Enforcement Officials (Police Chief, Sheriff, Fire Marshall)
 - Division Engineer
 - District Engineer
- All magazine construction will conform to the requirements of OSHA 1910.109 and US Department of the Treasury, Bureau of Alcohol Tobacco and Firearms CFR 27, Part 55 which pertain to magazines.
- All magazines will be equipped with two five-tumbler padlocks. These locks shall be covered with one-quarter inch steel caps to prevent the use of saws or bolt cutters.
- Explosives logs for each magazine will be maintained by case, box, or bag and odd units (sticks, detonators, boosters or, in the case of bagged products, by weight) of explosives products. An entry will be made in the log each time explosives are taken from the magazine or returned to it. The log must reflect the exact quantity of each type of explosives product on hand at all times.

Note: NCDOT inventory control requirements are based on weight of the products; however, BATF and OSHA requirements are based on full case and unit count.

These requirements apply to electric and non-electric detonators, booster primers, binary (two component) explosives products, and any high explosives, low explosives, or blasting agents stored in the magazine.

Spray Finishing

SPP# 1910.107

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for spray finishing when using flammable and/or combustible materials.

2.0 Scope and Applicability

Paint spraying operations within the North Carolina Department of Transportation (NCDOT) are usually performed in detached buildings or areas or in spray booths. The paint spray mixtures contain combustible and flammable components. Therefore, precautions must be exercised during spray finishing operations to minimize hazards associated with combustible and flammable materials.

This safety policy and procedure provides guidelines for spray finishing when using flammable and/or combustible materials. It includes provisions for training, spray booth construction, and spray booth housekeeping guidelines. Additionally, guidelines are presented on illumination, ventilation, Personal Protective Equipment (PPE), drying of spray painted items, and storage of flammables and combustibles. Discussion is also presented on pipe, hose and container inspection guidelines, and disposal of cleaning solvents.

SAFETY POLICY & PROCEDURE

This document also details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This safety policy and procedure affects NCDOT employees in the:

- Equipment Unit
- Highway Maintenance
- Ferry Division
- Traffic Engineering
- Sign Shops
- Bridge Maintenance
- Aviation Unit

Additionally, this safety policy and procedure applies to employees in any other operation who are exposed to hazards associated with spray finishing using flammable and/or combustible materials.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.107).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT will operate spray paint booths to minimize employee exposure to flammable and/or combustible materials and to minimize fire hazards. When these hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Spray Finishing will be implemented.

These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Spray Finishing. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Spray Finishing.

6.1 Definitions

Aerated Solid Powders

Aerated solid powders shall mean any powdered material used as a coating material which shall be fluidized within a container by passing air uniformly from below. It is common practice to fluidize such materials to form a fluidized powder bed and then dip the part to be coated into the bed in a manner similar to that used in liquid dipping. Such beds are also used as sources for powder spray operations.

Approved

Shall mean approved and listed by a nationally recognized testing laboratory (i.e., Underwriters Laboratories [UL]).

Dry Spray Booth

A spray booth not equipped with a water washing system. A dry spray booth may be equipped with:

- Distribution or baffle plates to promote an even flow of air through the booth
- Overspray dry filters to minimize dusts
- Overspray dry filters to minimize dusts or residues entering exhaust ducts
- Overspray dry filter rolls designed to minimize dusts or residues
- Powder collection systems when dry powders are being sprayed

Electrostatic Fluidized Bed

A container holding powder coating material which is aerated from below to form an air-supported expanded cloud of such material which is electrically charged with a charge opposite to the charge of the object to be coated. Such object is transported through the container immediately above the charged and aerated materials in order to be coated.

Fluidized Bed

A container holding powder coating material which is aerated from below to form an air-supported expanded cloud of such material through which the preheated object to be coated is immersed and transported.

Spray Booth

A power-ventilated structure provided to enclose or accommodate a spraying operation to confine and limit the escape of spray, vapor, and residue, and to safely conduct or direct them to an exhaust system.

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Spraying Area

Any area in which dangerous quantities of flammable vapors or mists, or combustible residues, dusts, or deposits are present due to the operation of spraying processes.

Waterwash Spray Booth

A spray booth equipped with a water washing system designed to minimize dusts or residues entering exhaust ducts and to permit the recovery of overspray finishing material.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Booth Construction
- Housekeeping
- Illumination
- Ventilation
- PPE
- Storage of Flammables and Combustibles
- Pipes, Hoses, and Containers
- Cleaning and Residue Disposal
- No Smoking Signs

6.2.1 Training

Employees who perform spray finishing activities will be trained in the proper and safe operation of spray finishing operations. Additionally, they will be trained in:

- Why spray booths are used
- Hazards of combustible and flammable materials
- Types of spray finishing operations in NCDOT
- Understanding what PPE is required
- Storage and handling requirements for combustible and flammable materials

6.2.2 Booth Construction

Spray booths will be constructed of steel, concrete, masonry, or other non-combustible material. The structure will be adequately supported to ensure stability and will be designed to sweep air currents toward exhaust outlets and will meet all requirements of CFR 1910.107.

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Figure 1 illustrates a typical spray booth installation. In the event an approved spray booth is not available, spray finishing or spray painting may be done outside (out of doors) in open air with the supervisor's approval.

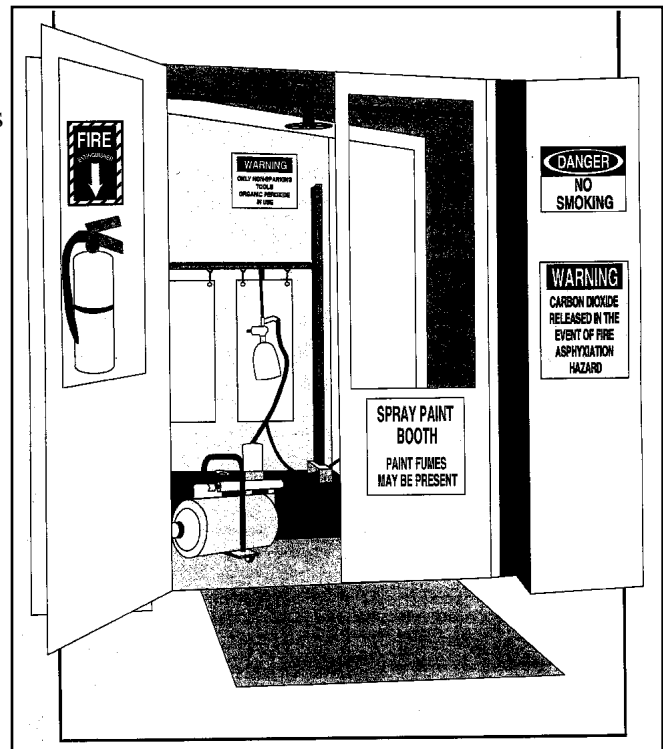


Figure 1

6.2.3 Housekeeping

Spray booth interiors will be kept clean with 3 feet on all sides of the booth clear of storage and combustible materials.

6.2.4 Illumination

Spray booths will be illuminated by protected lighting devices such as recessed or covered lighting fixtures. Clear panels may be used to cover fluorescent lights to protect them from overspray. All lighting fixtures will be mounted in locations that are isolated or not likely to be broken or damaged by the operation.

All wiring will be placed in conduit boxes or in fittings containing no taps, splices, or terminal connections.

6.2.5 Ventilation

All spraying areas will be equipped with mechanical ventilation adequate to remove flammable vapors, mists, or powders to a safe location and to confine and control combustible residue. Ventilation systems will operate during the entire spray operation and afterward until vapors are safely removed. Exhaust will be directed outside of buildings into areas where it will not accumulate in pockets and cause fire hazards.

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Fans used to ventilate spray rooms will be constructed to reduce the chance of friction fires by using nonferrous or nonsparking material at friction points. Fan motors will be mounted outside booths or ducts and will be protected by a cage or other device to prevent damage from other operations.

Refer also to [SPP# 1910.301, Electrical Related Safe Work Practices](#), for additional details on electrical safety requirements.

6.2.6 Personal Protective Equipment (PPE)

Respirators are required for any spray finishing other than very minor touch-up procedures. Where negative pressure respirators are worn, the user must be properly enrolled in the NCDOT Respirator Program. (See [SPP# 1910.134](#) for specific requirements.)

Safety footwear (steel toe shoes/boots) will be required when there is a potential for foot injury from rolling or falling objects or from objects piercing the sole. Safety helmets (hard hats) will be required when head injury by falling materials or objects could occur.

Affected employees will use appropriate eye and/or face protection when exposed to eye or face hazards from flying particles, liquid chemicals, molten metals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. (See [SPP# 1910.132](#) for specific PPE requirements.)

Hand protection will be required when hazards such as skin absorption of harmful substances, severe cuts, lacerations, abrasions, puncture wounds, harmful extremes of temperature, or burns from thermal or chemical sources are present.

6.2.7 Drying

Equipment, parts, and/or components that have been sprayed will be placed in a designated area for drying that is free from all sources of ignition.

6.2.8 Storage of Flammables and Combustibles

Storage of flammables and combustibles will comply with [SPP# 1910.106, Flammable and Combustible Liquids](#). The quantity of flammables and combustibles located inside the spray booth will not exceed the expected amount for use during the particular operation.

6.2.9 Pipes, Hoses and Containers

All pipes, hoses, and connectors will be checked periodically to ensure they are functioning properly. All frayed, worn, or damaged equipment will be repaired or replaced immediately before operations can begin or continue.

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Only approved containers will be used to store, transport, or spray materials. Spray gun containers will be constructed of metal, with properly sealing lids, and designed with relief valves to prevent air pressure buildup.

When flammable or combustible material is transferred from one container to another, the containers will be properly electrically grounded or bonded to prevent static electricity discharges.

6.2.10 Cleaning and Residue Disposal

All cleaning solvents will be restricted to those having flashpoints of not less than 100°F. Solvents normally used to clean spray equipment are not restricted by this. All cleaning of equipment will be done inside the spray booth with proper ventilation in operation.

Residue, stripping, and other debris will be disposed of daily in closed metal containers with tightly fitting covers and stored in a safe location until removed from the facility.

6.2.11 No Smoking Signs

All spray booth areas will have posted "No Smoking" signs large enough in contrasting colors (as shown in Figure 2) to adequately warn all employees of the hazardous operation. Warning signs will be cleaned or replaced as required to ensure they are readable at all times. Refer to [SPP # 1910.145, Accident Prevention Signs and Tags](#), for additional signage details.

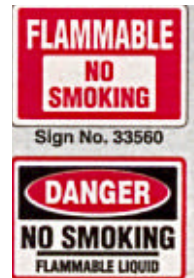


Figure 2

6.3. Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of proper equipment, supplies and training. They will be also responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with spray finishing through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with spray finishing. Supervisors will ensure that precautions are taken to ensure that employees are protected from sources of ignition, any possible drift of sprayed materials, and other hazards.

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Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are provided with the appropriate PPE as necessary for their job.

Supervisors will ensure that only qualified employees are assigned or permitted to perform duties related to the hazards of spraying operations using flammable and/or combustible materials.

Supervisors will ensure that hazards caused by broken, worn, defective, or otherwise inappropriate supplies, materials, tools, or equipment are repaired before the work begins.

Supervisors will perform daily pre-shift checks for visibly damaged, worn, or frayed pipes, hoses, and connectors and will conduct more detailed periodic inspections to ensure safe operations.

6.3.3 Employees

It is the responsibility of each employee to identify potential hazards when required to work with or near spraying operations using flammable and/or combustible materials and report immediately those suspected hazards to his or her supervisor.

It is also the responsibility of each employee to refrain from work involving exposure to potential hazards of spraying operations using flammable and/or combustible materials without instruction/training specific to the hazards of the tasks involved.

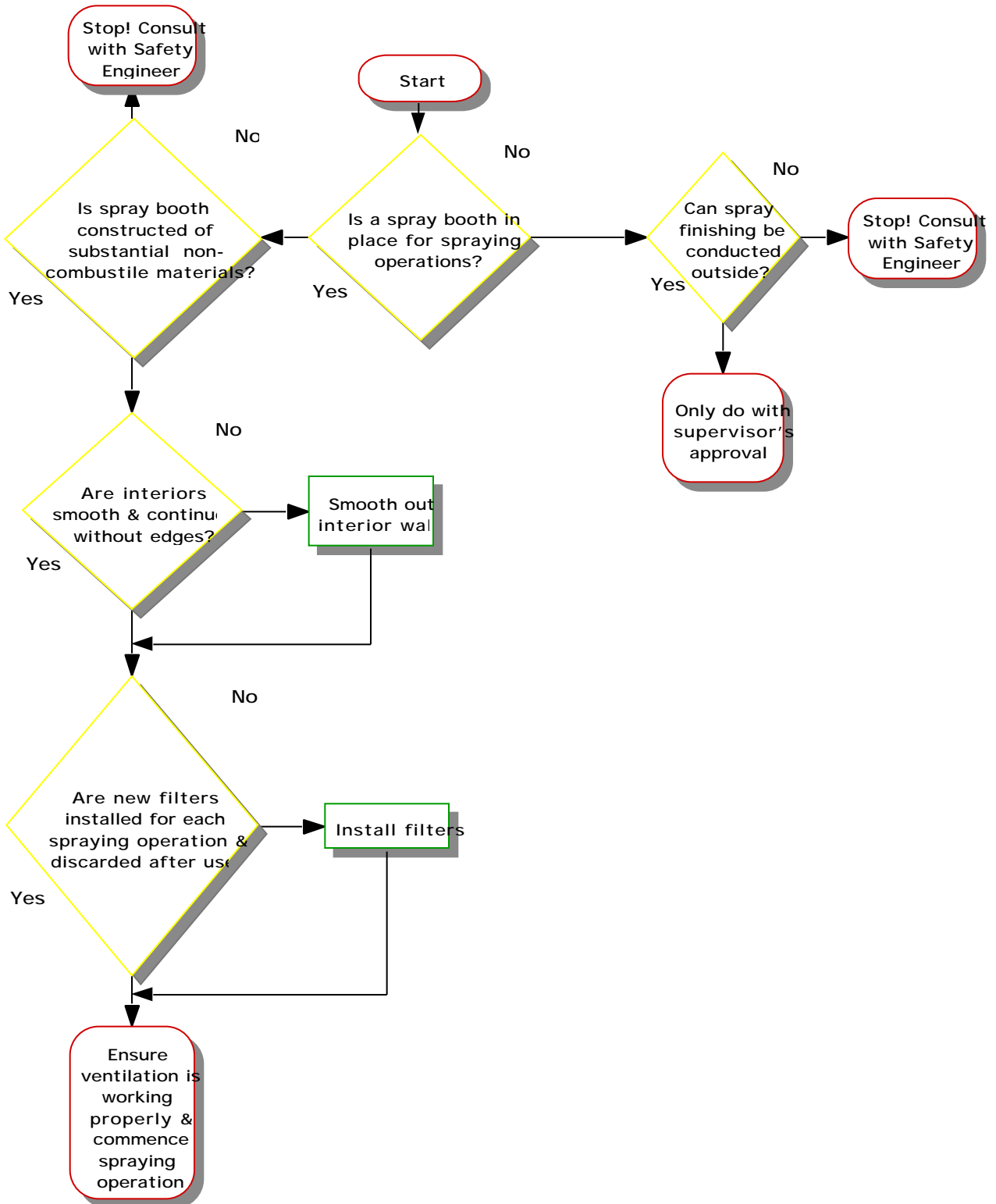
Employees will report to their supervisors all frayed, worn, damaged, or otherwise defective equipment.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure including surveys of spray finishing operations. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased spray paint booths comply with current safety regulations.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Spray Finishing Flowchart



Machine Guarding**SPP# 1910.212****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish requirements for the safety of North Carolina Department of Transportation (NCDOT) employees while working near machines with hazardous moving parts.

2.0 Scope and Applicability

A wide variety of mechanical motions and actions on machines may present hazards to NCDOT employees. These can include movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth, and any part that may impact or shear.

This safety policy and procedure provides guidelines for safeguarding and recognizing mechanical hazards due to dangerous moving parts. It includes provisions for training, discussion on where these hazards occur, machine guarding requirements, machinery maintenance and repair requirements, label, signs, and marking requirements for machines with hazardous moving parts.

SAFETY POLICY & PROCEDURE

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure includes but is not limited to the following equipment typically used in NCDOT:

- Concrete Circular Saws
- Woodworking Machines (Circular, Radial, Handsaws)
- Power Lawnmowers
- Power Presses
- Metal Working Machines
- Walk-Behind Rotary Mowers
- Abrasive Wheel Machines (Grinders)
- Pulleys
- Sprockets
- Chains
- Fanbelts
- Jointers and Sanding Machines
- Flywheels
- Hand and Portable Power Tools
- All classes of mechanized field equipment

This document also affects any employee who is exposed to mechanical hazards due to a machine's moving parts including machine operators and maintenance and repair personnel.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.212 through 1910.244).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, any machine part, function, or process that may cause injury must be guarded. When mechanical hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Machine Guarding will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Machine Guarding. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Machine Guarding.

6.1 Definitions

Abrasive Wheel

A bench grinder wheel consisting of various particles bonded together and used for grinding objects to a particular shape or size.

Electrical Guard

Electronic means of protection provided to protect employees from electrical components or accidental equipment start-up.

Guard

An enclosure designed to protect employees from rotating or moving mechanical parts.

Kickback Device

Any device that protects the operator from equipment throwing the work back towards the operator.

Portable

Hand-held operated.

Ring Test

The use of a non-metallic object to tap a grinding wheel at 45 degree intervals. If the wheel exhibits a dead sound, the wheel is unsafe to use.

Shield

An enclosure or barrier designed to protect employees from processes involving the possibility of disintegrating machine parts or parts being ground upon, pressed, or struck.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Recognizing Where Hazards Occur
- Machine Guarding Requirements
- Machinery Maintenance and Repair
- Label, Signs, and Marking Requirements

6.2.1 Training

Employees who operate machines with hazards due to moving parts shall be trained on how to use the machine guards and why the guards are in place. Employee training should include the following instructions and hands-on training:

- Description and identification of the hazard associated with the machine
- The guards, how they provide protection, and the hazard for which they are intended
- Precautions to take when machine is unguarded during maintenance and repair
- What to do and who to contact if a guard is damaged, missing, or defective

Employees shall be trained upon initial assignment or when any new guards are put in place.

6.2.2 Recognizing Where Hazards Occur

Dangerous moving parts on machines presents hazards that need guarding. The three basic areas that require machine guarding are:

- Point of Operation
- Power of Transmission Apparatus
- Other Moving Parts

The point of operation is that point where work is performed on the material, such as cutting, shaping, boring, or forming of stock.

Power transmission apparatus are all components of the mechanical system which transmit energy to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, crank, and gears.

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Other moving parts include all parts of the machine which move while the machine is in operation. These can be reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

6.2.3 Machine Guard Types

Guards are barriers which prevent access to danger areas. The four general types of guards are:

- Fixed
- Interlocked
- Adjustable
- Self-adjusting

A fixed guard is a permanent part of the machine. It is not dependent upon moving parts to perform its intended function. Figure 1 presents an example of a fixed guard.

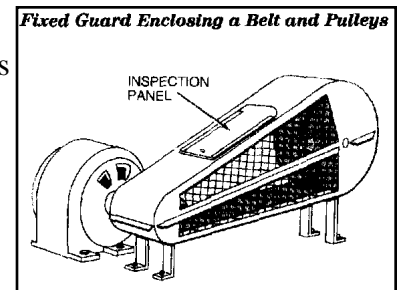


Figure 1

Interlock guards, when they are opened or removed, automatically shuts off or disengages the machine. Adjustable guards allow flexibility in accommodating various sizes of stock as illustrated in Figures 2, 3, and 4. Self-adjusting guards protect the operator by placing a barrier between the danger area and the operator.

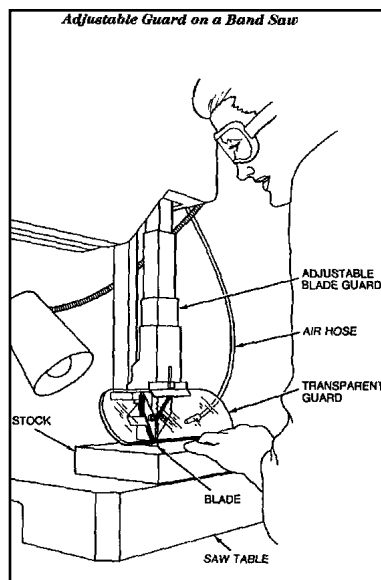


Figure 2

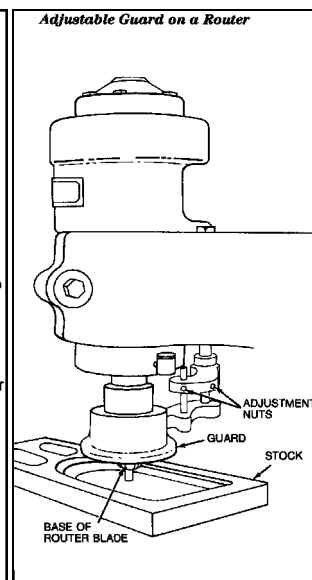


Figure 3

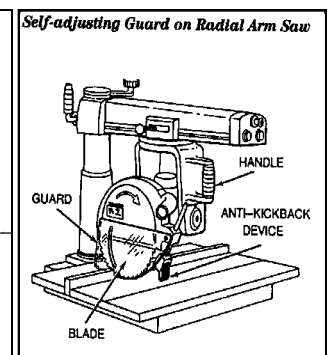
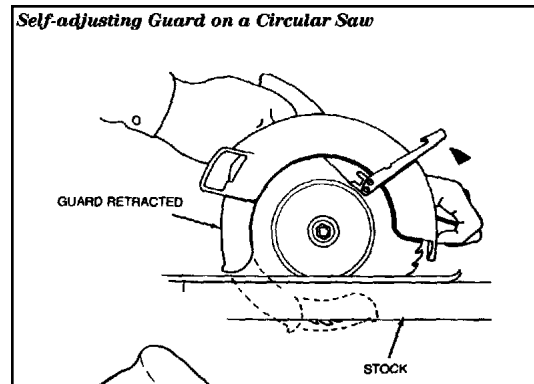


Figure 4

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Self-adjusting guards allow a large enough opening to admit stock. After the stock is removed, the guard returns to its rest position. Figure 5 presents an example of a self-adjusting guard.

Figure 5



6.2.4 Machine Guarding Requirements

Machine guards must protect employees from mechanical hazards. To do so, these machine guards must:

- Prevent contact
- Be secured to the machine
- Protect from falling objects
- Not create new hazards
- Not interfere with job performance
- Allow for safe lubrication of the machine

Appendix A presents a checklist to determine your operation's machine guarding needs.

Examples of guarding methods include barrier guards, two hand-tripping devices, and electronic safety devices. Appendix B presents general machine guarding requirements.

Appendix C presents examples of some specific machine guarding requirements on selected NCDOT equipment.

6.2.5 Machinery Maintenance and Repair

Machine design should permit lubrication and adjustment without removal of guards. If machine guards must be removed, the maintenance and repair crew must never fail to replace them.

Ideally, maintenance work should not be performed until the machine is disconnected and locked out. For mechanical power presses, safety blocks should be used as an additional safeguard, although the machine may be locked out electronically. Refer to [SPP # 1910.147, Lockout/Tagout](#), for details on Lockout/Tagout Procedures.

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All woodworking machines will be maintained in good condition. This includes replacing dull blades, cutting heads, and damaged or unserviceable parts. Equipment blade changes or adjustments will be performed only when the power source has been disconnected to comply with the lockout, tagout standard. Equipment in which guards cannot be installed shall be removed from service. This includes older equipment which never had factory-installed guards.

All bearings will be lubricated and any debris removed from their surface to prevent fires. All adjustments will be made by an employee who is trained and knowledgeable about the particular piece of equipment being adjusted.

6.2.6 Label, Signs, and Marking Requirements

Appendix D presents some specific examples of label requirements for machine guarding.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of machine guards for their operation. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that affected employees are trained in the safe operation of all machines which will be used in the performance of their duties.

Supervisors will ensure that an adequate supply of Personal Protective Equipment (PPE) is maintained in inventory and that employees are provided with PPE as necessary for their job.

6.3.3 Employees

Employees shall immediately inform their supervisor if any guard or shield is damaged or becomes inoperable.

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Employees shall also report immediately any recognized hazard to their supervisor.

Employees shall not operate any machine which does not have an operable guard as originally designed.

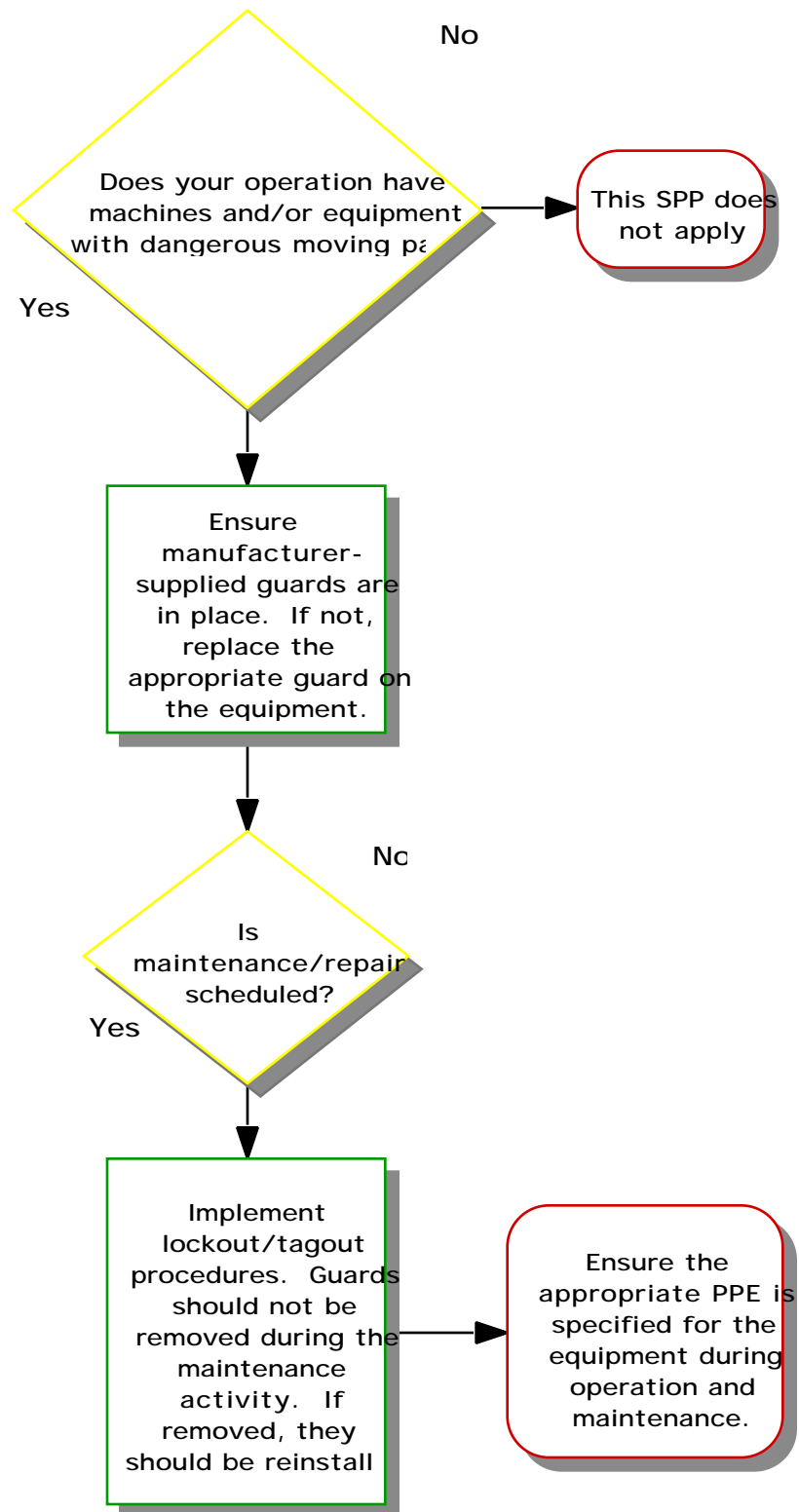
Employees shall not remove or otherwise modify any machine guard except to perform allowed routine maintenance or service.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased machines with hazardous moving parts comply with this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Machine Guarding Flowchart



APPENDIX A: Machine Guarding Needs Checklist

Requirements for All Safeguards

Yes No

- | | | | |
|--------------------------|--------------------------|---|---|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Do the safeguards prevent workers' hands, arms, and other body parts from making contact with dangerous moving parts? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are the safeguards firmly secured and not easily removed? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Do the safeguards ensure that no objects will fall into the moving parts? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Do the safeguards permit safe, comfortable, and relatively easy operation of the machine? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Can the machine be oiled without removing the safeguard? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Is there a system for shutting down the machinery before safeguards are removed? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Can improvements be made to the existing safeguards? |

Mechanical Hazards

The point of operation:

- | | | | |
|--------------------------|--------------------------|---|---|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Is there a point-of-operation safeguard provided for the machine? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Does it keep the operator's hands, fingers, and body out of the danger area? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Is there evidence that the safeguards have been tampered with or removed? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could you suggest a more practical, effective safeguard? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Could changes be made on the machine to eliminate the point-of-operation hazard entirely? |

Power transmission apparatus:

- | | | | |
|--------------------------|--------------------------|---|--|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are there any unguarded gears, sprockets, pulleys, or fly-wheels on the apparatus? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are there any exposed belts or chain drives? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are there any exposed set screws, key ways, or collars? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are starting and stopping controls within easy reach of the operator? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | If there is more than one operator, are separate controls provided? |

Other moving parts:

- | | | | |
|--------------------------|--------------------------|---|---|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are safeguards provided for all hazardous moving parts of the machine, including auxiliary parts? |
|--------------------------|--------------------------|---|---|

APPENDIX A: Machine Guarding Needs Checklist (Continued) 2

Nonmechanical Hazards

Yes No

- | | | | |
|--------------------------|--------------------------|---|---|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Have appropriate measures been taken to safeguard workers against noise hazards? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Have special guards, enclosures, or Personal Protective Equipment (PPE) been provided, where necessary, to protect workers from exposure to harmful substances used in machine operation? |

Electrical Hazards

- | | | | |
|--------------------------|--------------------------|---|---|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Is the machine installed in accordance with National Fire Protection Association and National Electrical Code requirements? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are there loose conduit fittings? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Is the machine properly guarded? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Is the power supply correctly fused and protected? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Do workers occasionally receive minor shocks while operating any of the machines? |

Training

- | | | | |
|--------------------------|--------------------------|---|---|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Do operators and maintenance workers have the necessary training in using the safeguards and why? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Have operators and maintenance workers been trained in locating safeguards, how they provide protection, and what hazards they protect against? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Have operators and maintenance workers been trained in the circumstances in which guards can be removed? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Have workers been trained in the procedures to follow if they notice damaged, missing, or inadequate guards? |

Protective Equipment and Proper Clothing

- | | | | |
|--------------------------|--------------------------|---|--|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Is Personal Protective Equipment (PPE) required? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | If PPE is required, is it appropriate for the job, in good condition, kept clean and sanitary, and stored carefully when not in use? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Is the operator dressed safely for the job (that is, no loose-fitting clothing or jewelry)? |

APPENDIX A: Machine Guarding Needs Checklist (Continued) 3

Machinery Maintenance and Repair

Yes No

- | | | | |
|--------------------------|--------------------------|---|--|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Have maintenance workers received up-to-date instruction on the machinery they service? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Do maintenance workers lock out the machine from its power sources before beginning repairs? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Where several maintenance persons work on the same machine, are multiple lockout devices used? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Do maintenance persons use appropriate and safe equipment in their repair work? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Is the maintenance equipment itself properly guarded? |

Other Items to Check

- | | | | |
|--------------------------|--------------------------|---|--|
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are emergency stop buttons, wires, or bars provided? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are the emergency stops clearly marked and painted red? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are there warning labels or markings to show hazardous areas? |
| <input type="checkbox"/> | <input type="checkbox"/> | • | Are the warning labels or markings appropriately identified by yellow, yellow and black, or orange colors? |

APPENDIX B: General Machine Guarding Requirements

- The machine guard must prevent hands, arms, or any other part of an employee's body from making contact with dangerous moving parts. A good machine guard system eliminates the possibility of the operator or another person placing his or her hands near hazardous moving parts.
- Employees should not be able to remove or tamper easily with the machine guard. Guards should be made of durable material that will withstand normal use and must be firmly secured to the machine.
- Falling objects should not be able to fall into any moving parts of the machine. Small objects or tools dropped into cycling machines can easily become projectiles.
- A machine guard should not have any shear points, sharp edges, or unfinished surfaces which could cause lacerations. If a machine guard creates a new hazard, it defeats its own purpose.
- Any machine guard which impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded.
- The machine should be able to be lubricated without removing the guards. Locating oil reservoirs outside the guards with a line leading to the lubrication point will reduce the need for the operator or maintenance worker to enter the hazardous area.

SAFETY POLICY & PROCEDURE

APPENDIX C: Specific Machine Guarding Requirements on Selected NCDOT Equipment

Bandsaws

All portions of the blade on a bandsaw will be guarded except for the portion of the blade being used to cut. This guard will be adjusted for different thicknesses of stock. All roller or guide wheels will be enclosed to protect against pinching. Tension adjustments will be made to ensure the blade is at the proper tension level to reduce breakage and injury. Proper PPE shall be worn at all times.

Circular Saw

Any circular saw provided with manufacturer installed guards shall have these guards in place and in operable conditions when the saw is in operation. This will include guards protecting pulleys, chains, gears, shafts, and other moving parts. All saw fences and kickback devices such as kickback pawls or "dogs" will be in use during operation regardless of the angle or the thickness of the cut being performed. If fences or other safety devices are removed during the change of blades, etc. they shall be replaced prior to operation. If conditions arise in which the supplied guard cannot be used, then a suitable jig will be used in place of the guard provided the limits of the saw are not exceeded. Unusual shaped materials will not be cause for routine removal of guards. If conditions are such that the saw blade is exposed and contact with the blade from either beneath or behind the saw table is possible, then that portion of the blade must be guarded against contact. Proper PPE shall be worn at all times.

Compressed Air

Compressed air used for cleaning purposes shall be regulated at the gun to a maximum of 30 psi. Employees operating gun shall wear PPE as well as take measures to protect adjacent workers from flying debris.

Concrete Saw (Circular)

All factory supplied blade guards will be placed in the lowered position prior to start up. Blade guards will be raised only when cutting is completed and the engine has been shut down. The blade guide bar shall be installed and maintained to deem it unnecessary to raise the guard to see the surface guide mark. Only the proper type of blade will be used in these saws.

Hand and Portable Power Tools

NCDOT supervisors shall be responsible for ensuring all hand tools are in good working condition and that tools are used as designed for specific tasks, such as hammering, cutting, or driving screws, bolts, and nuts. Proper PPE shall be worn at all times when employees' duties require use.

APPENDIX C: Specific Machine Guarding Requirements on Selected NCDOT Equipment (Continued) 2

Jointers

All jointers or planers will be adjusted to prevent the knife edge of the blade from extending more than 1/8 inch in height. The blade opening or throat that exposed the cutting blade will be no more than 2-1/2 inches when tables are set for zero cuts. Proper PPE shall be worn at all times when operating this equipment. All jointers or planers will be equipped with the automatic adjustable guards that cover the cutting surface completely. The guard will automatically adjust itself to cover the unused portion of the cutting head and will remain in contact with the stock at all times.

Portable Circular Saws (Skill Saw)

Guards will be used and maintained in good condition on portable circular saws to prevent contact with the operator or support surface. The upper guard will cover the entire upper portion of the blade down to the shoe. The bottom or cutting portion of the blade will be covered by a retractable guard designed to rotate and expose only the portion of the blade being used to cut.

Power Lawnmowers

All mowing equipment shall be operated with the manufacturer installed guards in operable condition. Pieces of guards missing or damaged guards shall be repaired before mowers are returned to service. All walk-behind, riding rotary, and reel power mowers will have guards in place to protect the operator from power chains, belts, gears, and thrown objects.

All controls will be clearly identified and operators trained before operation. A stop or kill switch shall be provided to quickly shut down the mower. Proper PPE shall be worn at all times.

Power Presses

All materials being pressed on electrically or manual hydraulic powered presses shall be guarded by a 1/4 inch Lexan shield or an expanded metal shield placed between the part and the operator. This shield may be fixed to the press or portable. The shield shall be used when pressing any type of material.

Radial Saws (Radial Arm)

Radial saws will be designed with an adjustable guard to prevent the blade from extending beyond the material being cut. The table used for installation of the saw will be elevated in the front so as to allow the blade to return to the back of the table when the cut is complete. Radial saws with functioning auto return springs need not be tilted. Radial saws will be operated with a upper hood that fully encloses the upper portion of the blade. The hood will be constructed in such a manner that it will protect the operator from flying debris (i.e., sawdust or chips). Radial saws will use safety kickback devices such as pawls or "dogs" to reduce the risk of wood being kicked back at the operator. The saw will be labeled with information advising the operator of the direction of travel of the blade. Proper PPE shall be worn at all times.

SAFETY POLICY & PROCEDURE

APPENDIX C: Specific Machine Guarding Requirements on Selected NCDOT Equipment (Continued) 3

Sanding Machines

Each sanding machine will be provided with guards in place at all nip points where the sanding belt runs onto a pulley (roller). Any portion of the sanding belt not in use will be guarded against contact while the machine is in use. Proper PPE shall be worn at all times when operating this equipment.

Walk-Behind and Riding Mowers

The mower blade will be fully enclosed except on the bottom and the deck will extend below the lowest cutting point of the blade in the lowest cutting position. If a bag attachment is used, warning instructions will be affixed to the deck adjacent to the discharge chute which will state that mower is not to be used without guards in place.

Openings in the deck for the discharge will not exceed 30 degrees of the entire surface of the deck itself. The opening will be labeled "Danger Keep Hands and Feet Clear" or stronger wording.

All safety devices such as those controlling clutch engagement, blade engagement, or rotation of any part will not be altered or bypassed to prevent it from being used.

Wheel Inspections

Immediately before mounting, all grinding wheels will be inspected and "ring" tested. The wheel must have two blotters before it can be installed. Wheel washers must fit properly against blotters and the nut hand tightened only.

Woodworking Machines

All woodworking machines will be operated with the manufacturer-installed guards in place at all times. Removal of guards will be allowed only for adjustment or repair. Equipment will be locked or tagged out of service during adjustments or repair in accordance with NCDOT safety policy and procedure on lockout and tagout.

Work Rests

On off hand grinding machines, work rests will be used to support the stock. The guards will be adjusted to allow for wheel wear and will be positioned (no more than 1/8") from the wheel to prevent the material from being jammed between the wheel and guard. Guard and wheel adjustment and replacement will be performed only after the equipment has been locked or tagged out.

APPENDIX D: Selected Machine Guarding Labeling Requirements

Appropriate labels shall be placed on all machines (old and new) requiring machine guarding when the machine is not in operation or while it is being serviced. If labels have been painted over, defaced, or removed they should be replaced .

Woodworking Machinery Requirements

Radial Saws

The direction of the saw rotation must be conspicuously marked on the hood. In addition, a permanent label at least 1-1/2 inches by 3/4 inch must be affixed to the rear of the guard at about the level of the arbor. The label must read as follows:

DANGER:

DO NOT RIP OR PLOUGH FROM THIS END

Mechanical Power Presses

Presence Sensing Device Initiation (PSDI)

Prior to the initial use of any mechanical press in the PSDI mode, two sets of certification and validation are required.

A label shall be affixed to the press as part of each installation certification/validation and the most recent recertification/revalidation. The label must indicate:

- The press serial number
- The minimum safety distance
- The fulfillment of design certification/validation
- The employer's signed certification
- The identification of the OSHA-recognized third party validation organization and its signed validation
- The date the certification/validation and recertification/revalidation are issued

Portable Power Tools Guards

Power Lawn Mowers

The phrase "CAUTION. BE SURE THE OPERATING CONTROL(S) IS IN NEUTRAL BEFORE STARTING THE ENGINE" or similar wording must be clearly visible at an engine starting control point on self-propelled mowers.

APPENDIX D: Selected Machine Guarding Labeling Requirements (Continued) 2

Portable Powered Tool Guards (Continued)

Walk-Behind and Riding Rotary Mowers

Warning instructions must be affixed to the mower near the opening stating that the mower shall not be used without either the catcher assembly or the guard in place.

The word “CAUTION” or stronger wording must be placed on the mower at or near each discharge opening.

Jacks - Loading and Marking

The rated load shall be legibly and permanently marked in a prominent location on the jack by casting, stamping, stenciling, or other suitable means.

Jacks which are out of order shall be tagged accordingly.

Cranes**SPP# 1910.179****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish crane operation procedures for North Carolina Department of Transportation (NCDOT) employees who operate or work in close proximity to cranes.

2.0 Scope and Applicability

A variety of cranes are used in NCDOT operations from bridge and road construction to indoor material handling. Cranes are an important category of machinery in NCDOT because of the productivity and economic benefits associated with crane use. However, cranes can be dangerous pieces of equipment if basic hazards are ignored.

This safety policy and procedure provides guidelines for avoiding hazards associated with crane operation. It includes provisions for training, discussion on the types of cranes used in NCDOT, listing of hazards common to cranes, and discussion on crane safety.

This document also details the areas of responsibility for manager/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

SAFETY POLICY & PROCEDURE

This safety policy and procedure affects crane operators, riggers, signalers, and any employee who as a result of his or her job duties works with or near cranes.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.179) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.550).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT cranes will not be operated by untrained employees or in a manner that endangers employees or the public. When crane hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding cranes will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Cranes. It is also the responsibility of each NCDOT employee to report immediately any unsafe condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Cranes.

6.1 Definitions

Accessory

An assembly of parts which contributes to the overall function and usefulness of a machine.

Appointed

Assigned employee with specific responsibilities by the employer or the employer's representative.

SAFETY POLICY & PROCEDURE

Angle Indicator

An accessory which measures the angle of the boom to the horizontal.

Axis of Rotation

The vertical axis around which the crane superstructure rotates.

Axle

The shaft or spindle with which or about which a wheel rotates. On truck and wheel mounted cranes it refers to an automotive type of axle assembly including housings, gearing, differential, bearings, and mounting appurtenances.

Axle (Bogie)

Two or more automotive type axles mounted in tandem in a frame which divide the load between the axles and permit vertical oscillation of the wheels.

Base

The traveling base or carrier on which the rotating superstructure is mounted such as a car, truck, crawlers, or wheel platforms.

Boom

A member hinged to the front of the rotating superstructure with the outer end supported by ropes leading to a gantry or A-frame and used for supporting the hoisting tackle.

Boom Angle

The angle between the longitudinal centerline of the boom and the horizontal. The boom longitude centerline is a straight line between the boom foot pin (heel pin) centerline and boom point sheave pin centerline.

Boom Hoist

A hoist drum and rope reeving system used to raise and lower the boom. The rope system may be all live reeving or a combination of live reeving and pendants.

Boom Stop

A device used to limit the angle of the boom at the highest position.

Brake

A device used for retarding or stopping motion by friction or power means.

Cab

A housing which covers the rotating superstructure machinery and/or operator's station. On crane trucks a separate cab covers the driver's station.

Clutch

A friction, electromagnetic, hydraulic, pneumatic, or positive mechanical device for engagement or disengagement of power.

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Counterweight

A weight used to supplement the weight of the machine in providing stability for lifting working loads.

Designated

Selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

Drum

The cylindrical members around which ropes are wound for raising and lowering the load or boom.

Dynamic Loading

A load introduced into the machine or its components by forces in motion.

Gantry (A-Frame)

A structural frame extending above the superstructure to which the boom support ropes are reeved.

Jib

An extension attached to the boom point to provide added boom length for lifting specific loads. The jib may be in line with the boom or offset to various angles.

Load (Working Load)

The external load in pounds applied to the crane including the weight of load-attaching equipment such as load blocks, shackles, and slings.

Load Ratings

Load ratings are the manufacturer's load capacity in pounds.

Outriggers

Extendible or fixed metal arms, attached to the mounting base, which rest on supports at the outer ends.

Rail Clamp

A tong-like metal device, mounted on a locomotive crane car, which can be connected to the track.

Reeving

A rope system in which the rope travels around drums and sheaves.

Rope

A wire rope unless otherwise specified.

Side Loading

A load applied at an angle to the vertical plane of the boom.

Standby Crane

A crane which is not in regular service but which is used occasionally or intermittently as required.

Standing (Guy) Rope

A supporting rope which maintains a constant distance between the points of attachment to the two components connected by the rope.

Structural Competence

The ability of the machine and its components to withstand the stresses imposed by applied loads.

Superstructure

The rotating upper frame structure of the machine and the operating machinery mounted thereon.

Swing

The rotation of the superstructure for movement of loads in a horizontal direction about the axis of rotation.

Swing Mechanism

The machinery involved in providing rotation of the superstructure.

Tackle

An assembly of ropes and sheaves arranged for hoisting and pulling.

Transit

The moving or transporting of a crane from one location to another.

Wheelbase

The distance between centers of front and rear axles. For a multiple axle assembly the axle center for wheelbase measurement is taken as the midpoint of the assembly.

Whipline

A separate hoist rope system of lighter load capacity and higher speed than provided by the main hoist.

Winch Head

A power driven spool for handling of loads by means of friction between fiber or wire rope and spool.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Types of Cranes Used in NCDOT
- Hazards Common to Cranes
- Crane Safety

6.2.1 Training

Crane operators must be well trained and licensed by NCDOT because cranes have become more sophisticated and complex.

NCDOT's licensing program for crane operators shall contain:

- A minimum educational level
- Hands-on training and work experience
- Classroom training on crane safety
- Obtaining knowledge of crane safety references
- Minimum physical qualifications

Additionally, riggers, signalers, and other affected employees will receive training specific to their tasks as related to crane operations.

6.2.2 Types of Cranes Used in NCDOT

There are a variety of cranes used within NCDOT. The cranes are used in a variety of settings from construction activities to overhead cranes. The typical cranes used in NCDOT are:

- Rough terrain and wheel-mounted cranes
- Commercial truck-mounted cranes
- Overhead cranes
- Gantry cranes

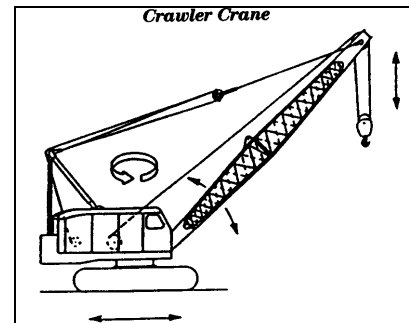


Figure 1

Figures 1, 2, and 3 illustrates some of the cranes used in NCDOT. Appendix A details specific operating practices for cranes used in NCDOT.

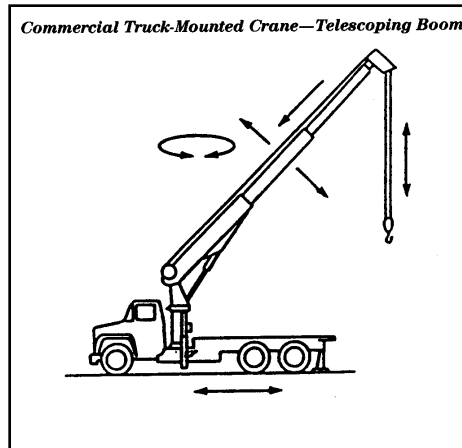


Figure 2

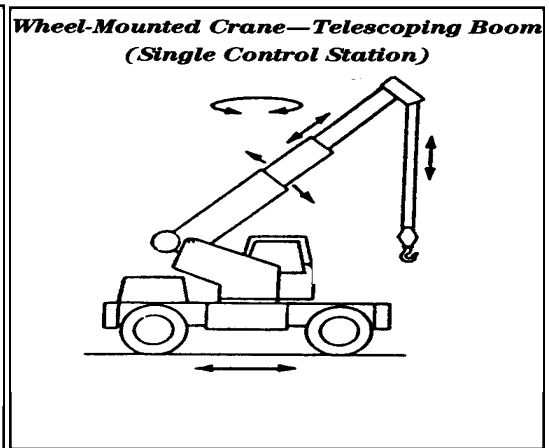


Figure 3

6.2.3 Hazards Common to Cranes

There are inherent hazards associated with crane operations. Therefore, being aware of these hazards is the first step in minimizing these hazards and in promoting a safe working environment. The most common hazards associated with crane use are:

- Powerline contact
- Overloading
- Failure to use outriggers; soft ground and structural failure
- Two-blocking
- Pinchpoints
- Obstruction of vision
- Travel upset in rough terrain cranes
- Boom disassembly on boom cranes

Appendix B presents and details preventive measures for these hazards.

6.2.4 Crane Safety

Crane accidents can be prevented if considerations are given to safe use and operation of the crane. The primary components of crane safety are:

- Competent and qualified employees who operate and work with and around cranes
- Hazard prevention requirements being in place

Refer to Section 6.2.1 for details on the competency and qualifications requirements for NCDOT crane operators.

SAFETY POLICY & PROCEDURE

Hazard prevention requirements include:

- Preconstruction planning
- Job hazard analysis
- Communication
- Lifting capabilities
- Rigging practices
- Controlling and holding the load
- Ballast or counterweights
- Footing
- Rope inspection and wire rope requirements
- Inspection schedule
- Transporting cranes
- Preventive maintenance

Appendix C presents further details on hazard prevention requirements for crane safety.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring adequate funds are available for the purchase of proper equipment, supplies, and training for crane operators and employees associated with crane operations.

Managers/Unit Heads will also be responsible for identifying the employees affected by this safety policy and procedure.

Manager/Unit Heads will obtain and coordinate the required training for the affected employees. Manager/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

Managers/Unit Heads shall be responsible for ensuring all cranes operators are properly trained.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will communicate appropriate needs to managers/unit heads and/or other supervisors.

Supervisors will ensure that employees are provided with PPE as necessary for their job.

SAFETY POLICY & PROCEDURE

Supervisors will ensure the safe operation of cranes. Additionally, they will ensure that all equipment, wire ropes, slings, and other related accessories are in good working condition. If any indication of damaged equipment is present, the equipment will be removed from service and repaired before operations begin.

6.3.3 Employees

Employees who are involved in crane operations will ensure that all safety procedures are followed. Operators will ensure specific operating procedures are followed. No load will be moved until all precautions have been taken to ensure that the load can be lifted, moved, and placed safely. Each employee is responsible to bring hazards to the attention of his or her supervisor for correction as soon as the hazard is recognized.

Employees will ensure that all PPE is worn properly for the specific hazard involved and that all equipment is in good working order. Refer to [SPP # 1910.135, Personal Protective Equipment](#), for additional details.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing and securing required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased equipment complies with safety regulations.

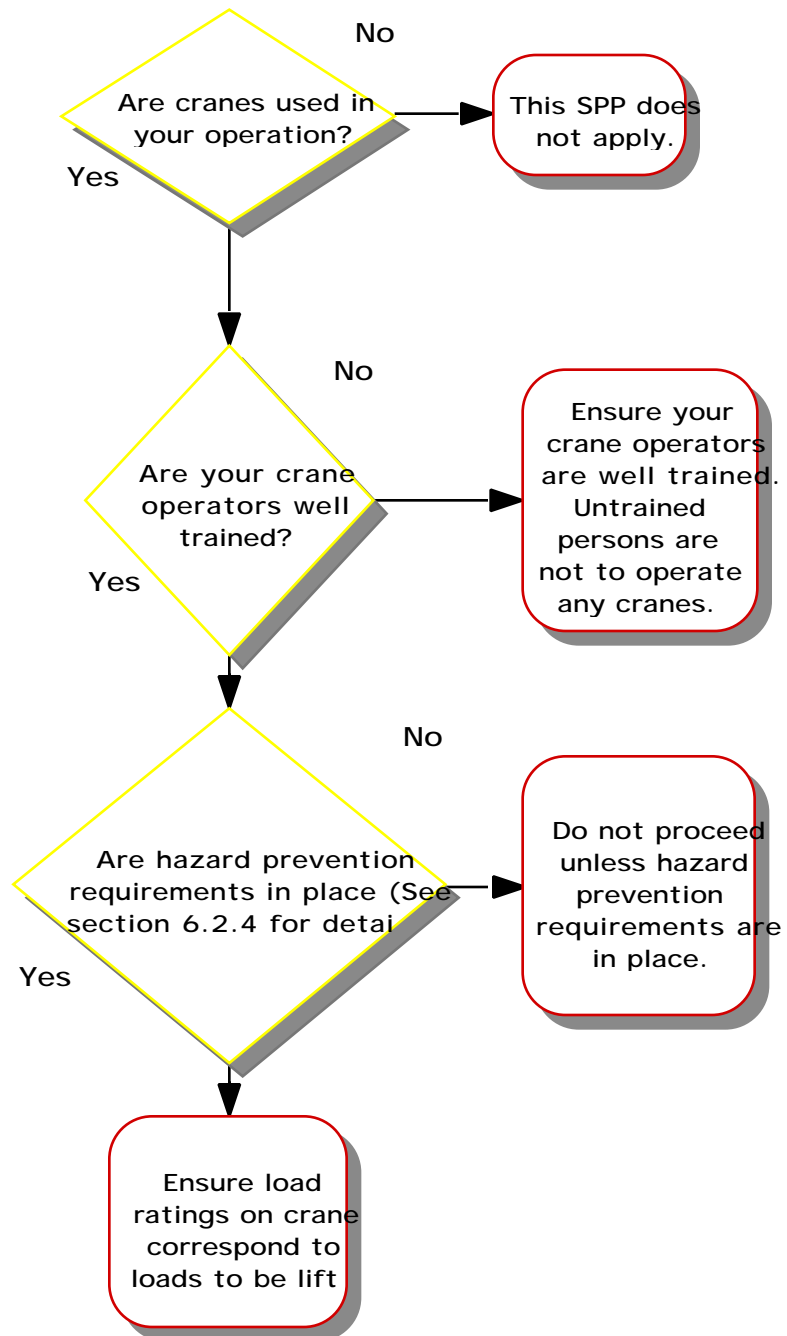
Safety and Loss Control will periodically inspect and report to supervisors any deficiencies observed that relate to cranes.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will be responsible for ensuring that all newly purchased cranes comply with this safety policy and procedure and current safety regulations.

Cranes Flowchart



APPENDIX : A Specific Operating Practices

Operating Practices

The operator shall not engage in any practice which will divert his attention while actually engaged in operating the crane.

When he or she is physically or mentally unfit, then the operator shall not engage in the operation of this equipment.

The operator shall respond to signals only from the appointed signal man, but shall obey a stop signal at any time, no matter who gives it.

The operator shall be responsible for those operations under his direct control. Whenever safety is in question, the operator shall have the authority to stop and refuse to handle loads until safety has been assured.

No load is to be moved until the swing path and the landing site have been assured to be safe.

If a warning signal is furnished, it shall be sounded each time before traveling and intermittently during travel, particularly when approaching workmen.

Before leaving his crane unattended, the operator shall:

- Land any attached load, bucket, or other device
- Disengage clutch
- Set travel, swing, boom brakes, and other locking devices
- Put controls in the OFF position
- Stop the engine
- Secure crane against accidental travel
- When wind alarm is given or on leaving crane overnight, set ground chocks on truck and crawler cranes
- Lower crane booms to ground level or otherwise fasten securely against displacement by wind loads or other outside forces
- If there is a lockout/tagout sign on the switch or engine starting controls, the operator shall not close the switch or start the engine until the warning or lock has been removed by the person placing it there
- Before closing the switch or starting the engine, the operator shall see that all controls are in the OFF position and all personnel are in the clear

If power fails during operation, the operator shall:

- Set all brakes and locking devices
- Move all clutch or other power controls to the OFF position
- If practical, the suspended load should be landed under brake control

APPENDIX A : Specific Operating Practices (Continued) 2

The operator shall familiarize him or herself with the equipment and its proper care. If adjustments or repairs are necessary, or any defects are known, he or she shall report the same promptly to the appointed person and upon changing shifts shall also notify the next operator of the defects.

All controls shall be tested by the operator at the start of a new shift. If any controls do not operate properly, they shall be adjusted or repaired before operations are begun.

Booms which are being assembled or disassembled on the ground with or without support of the boom harness should be securely blocked to prevent dropping of the boom and boom sections.

Moving Loads

The following procedures will be observed when moving loads:

- The crane will be level and blocked if necessary
- The load will be properly secured and balanced
- The rope will be straight, not kinked
- Multiple part lines will be straight, not kinked
- The hook will be brought over the load to prevent swinging
- The lifting action will be a smooth acceleration
- The load will clear all obstructions
- Side loading will be limited to freely suspended loads
- Cranes will not be used for dragging loads sideways
- No load will be moved while employees are on the load or hook
- Employees will not work under loads
- The brakes will be tested prior to each lift when the weight approaches the maximum for the crane
- Outriggers will be used when necessary
- Loads will not be lowered below the point where less than two wraps of rope remain on their drums

Operating Near Electric Power Lines

Cranes shall be operated near, under, over, or by power lines only in accordance with the following:

- For lines rated 50 kV or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet
- For lines rated over 50 kV minimum, clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV over 50 kV, or use twice the length of the line insulator but never less than 10 feet
- In transit with no load and boom lowered, the clearance shall be a minimum of 4 feet

APPENDIX A : Specific Operating Practices (Continued) 3

It is recommended that a person be designated to observe the clearance and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means.

Before the commencement of operations near electrical lines, the person responsible for the job shall notify the owners of the power lines or their representative providing them with all information about the specific job and requesting their cooperation.

Any overhead wire shall be considered to be energized unless the owner or the electrical utility representative gives positive indication that the line is not energized.

Appendix B: Hazards Common to Cranes

Powerline Contact

Powerline contact is the inadvertent contact of any metal part of a crane with a high-voltage powerline.

Most powerline contacts occur when a crane is moving materials adjacent to or under energized powerlines and the hoist line or boom touches a powerline. Contact also frequently occurs during pick-and-carry operations when loads are being transported under energized powerlines. Sometimes the person who is electrocuted is touching the crane or getting on or off of it when the hoist line or boom inadvertently comes into contact with an energized powerline.

The best hazard prevention method to avoid such an occurrence is to position the crane to keep a 10-foot clearance so the boom or hoist line cannot reach the powerlines.

Powerline contact usually occurs because no one considered the need for specific hazard prevention measures to avoid using cranes near powerlines. The key to avoiding powerline contact is prejob safety planning. Planning is one of the greatest accident deterrents available in the workplace.

A single individual should have overall supervision and coordination of the project and must initiate a positive direction to assure that prejob safety planning is done before any cranes arrive at the worksite.

It is extremely difficult for a crane operator to:

- Judge accurately clearances between a crane and powerlines simply through the use of vision
- See more than one visual target at a time
- Overcome the camouflaging characteristics that trees, buildings, and other objects have upon powerlines

Sometimes a crane operator cannot judge the clearance of the boom from the powerline because the boom blocks the operator's view to the right. Sole reliance upon the performance of crane operators, riggers, and signalers, without any planning to separate cranes from powerlines, has resulted in many deaths.

Overloading

Overloading occurs when the rated capacity of a crane is exceeded while a load is being lifted and maneuvered, resulting in upset or structural failure. Overloading also occurs when poorly trained personnel are allowed to operate cranes. The operator must always know the weight of the load.

Cranes easily upset from overloading. On some models, the weight of a boom without a load can create an imbalance and cause some high-reach hydraulic cranes to upset when the boom is positioned at a low angle. This has occurred even with outriggers extended.

Appendix B: Hazards Common to Cranes (Continued) 2

The variables that affect lifting capacity include:

- The ability to lower a boom increases the radius and reduces its capacity
- The ability to extend a hydraulic boom increases the radius and reduces lifting capacity
- The ability to lower a boom while extending a boom quickly reduces lifting capacity
- The crane's tipping capacity can vary when the boom is positioned at the various points of the compass or clock in relation to its particular carrier frame
- The operator may neglect to extend the outriggers and affect the crane's stability
- The operator may mistakenly rely upon his perception, instinct, or experience to determine whether the load is too heavy and may not respond fast enough when the crane begins to feel light.

All of these variables create conditions that lead to operators inadvertently exceeding the rated capacity, tipping the load, and upsetting the crane. The variables may also lead to structural failure of the crane.

With the advent of solid-state micro-processing electronics, load-measuring systems evolved. Such systems can sense the actual load boom angle and length, warn the operator as rated capacity is approached, and stop further movement. Load-measuring systems automatically prevent exceeding the rated capacity at any boom angle, length, or radius. Today, most U.S. crane manufacturers are promoting the sale of load-measuring systems as standard equipment on new cranes. There are after-market suppliers of these devices for older model cranes.

For years, the only control to avoid upset from overload has been reliance upon an operator's performance and the use of load charts. Optimally, formal training should be provided for all crane operators to ensure a working knowledge of crane load charts. However, on-the-job training can be adequate *if the trainer is qualified*.

Failure to Use Outriggers; Soft Ground and Structure Failure

Crane upset can occur when an operator does not extend the outrigger or when a crane is positioned on soft ground.

Many cranes upset because the use of outriggers is left to the discretion of the operator. For example, sometimes an operator cannot extend the outriggers because of insufficient space or outrigger pads may be too small to support the crane even on hard ground. However, the use of outriggers is not voluntary. Load capacity charts are based either on the use of fully extended outriggers or on "rubber" for rubber-tired cranes. If outriggers cannot be fully extended, then capacities in the on-rubber chart must be used.

Outriggers have collapsed because they were overloaded, defective, or located on inadequate foundation.

Appendix B: Hazards Common to Cranes (Continued) 3

Determining the load weights is generally viewed as the responsibility of the site supervisor who must inform the operator before the lift is made. The operator must still be able to determine or estimate load weights, to evaluate and verify the weight provided. Based on the load weight, the operator knows if it is necessary to use outriggers.

The surest way to avoid an accident is to make the machine inoperable until the operator activates necessary safeguards. This could include limit switches to prevent boom movement until outriggers are extended and in place to avert upset.

Soil failure occurs because the ground is too soft or the outrigger pads are not big enough. When poor soil is encountered, or the outriggers have inadequate floats or pads, well-designed blocking or cribbing is needed under the outriggers.

Two-Blocking

Two-blocking occurs when the hoist block or hook assembly comes into contact with the boom tip, causing the hoist line to break and the hook and load to fall, endangering workers below. Two-blocking also occurs because the crane operator is often visually overtaxed. He or she is unable to watch the load and headache ball or hook simultaneously.

Both latticework and hydraulic boom cranes are prone to two-blocking. When two-blocking occurs on latticework booms, the hoist line picks up the weight of the boom and lets the pendant guys go slack. When a hoist line two-blocks, it assumes the weight of the boom and relieves the pin-up guys of the load. The weight of the load plus the weight of the boom on a latticework boom (when combined with a little extra stress when lifting a load) can cause the hoist line to break if two-blocking occurs.

The power of the hydraulic rams that extend hydraulic booms is often sufficient to break the hoist line if the line two-blocks.

In many circumstances, both latticework and hydraulic boom cranes will two-block when the hook is near the tip and the boom is lowered.

OSHA now requires an anti-two-blocking device or a two-block damage prevention feature where cranes are used to hoist personnel.

There are several ways to prevent two-blocking:

- An anti-two-blocking device can be used. The device is a weighted ring around the hoist line that is suspended on a chain from a limit switch attached to the boom tip. When the hoist block or headache ball touches the suspended, weighted ring, the limit switch opens and an alarm warns the operator.
- On hydraulic cranes, the hydraulic valving can be sequenced to pay out the hoist line when the boom is being extended, thus avoiding two-blocking.

Appendix B: Hazards Common to Cranes (Continued) 4

- Adequate boom length can be ensured to accommodate both the boom angle and sufficient space for rigging, such as slings, spreader bars, and straps. To avoid bringing the hook and headache ball into contact with the boom tip, a boom length of 150 percent of the intended lift is required for a boom angle of 45 degrees or more.

Anti-two-blocking devices should be standard equipment on all cranes. Currently, most new mobile hydraulic cranes are being equipped with these systems.

Pinchpoints

There are two types of crane pinchpoints:

- Within the swinging radius of the rotating superstructure of a crane, in areas in which people may be working, is a pinch point where people can be crushed or squeezed between the carrier frame and the crane cab, or the crane cab and an adjacent wall or other structure.
- Many unguarded gears, belts, rotating shafts, etc., within the crane are pinchpoints to which employees may be exposed.

A pinch point is created by the narrow clearance between the rotating superstructure (cab) of a crane and the stationery carrier frame. This narrow clearance is referred to as the danger zone.

The swing area of the crane cab and counterweight must be barricaded against entry into the danger zone.

The removal of water jugs, tool boxes, and rigging materials from crane cabs would reduce the incentive to enter the danger zone.

The installation of rear view mirrors for the crane operator provides an added safeguard so the operator can see into the turning area of the cab and counterweight.

Obstruction of Vision

Safe use of a crane is compromised when the vision of an operator, rigger, or signaler is blocked and employees cannot see what the others are doing.

There are two general categories for obstructions to operators' vision:

- Obstruction by the crane's own bulk
- Obstruction by the work environment

The crane size alone limits the operator's range of vision and creates many blind spots, preventing the rigger, signaler, oiler, and others affected by the crane's movement from having direct eye contact with the crane operator.

Appendix B: Hazards Common to Cranes (Continued) 5

To overcome the hazard of blind spots while loads are being lifted, the use of radios and telephones is much more effective than relying upon several signalers to relay messages by line of sight.

The use of automatic travel alarms is an effective way to warn those in the immediate vicinity of crane travel movement in pick-and-carry functions.

Travel Upset in Mobile Hydraulic Cranes (Rough Terrain and Wheel-Mounted Telescoping Boom)

Because of a high center of gravity, a mobile hydraulic crane can easily upset and crush the operator between the boom and the ground.

This type of crane is easily overturned on road shoulders or other embankments during travel from one location to another.

The best preventive measure for operator safety is the installation of a crush-resistant cab and seatbelt. In the event of a travel upset, the operator would be protected.

Boom Disassembly on Latticework Boom Cranes

If a boom is not blocked, improper disassembly can cause it to collapse upon those who are removing pins under the boom while the boom is suspended.

Latticework booms are disassembled for shortening, lengthening, or transporting. Boom collapse occurs on truck- or crawler-mounted cranes when the boom is lowered to a horizontal position and suspended from the boom tip with pendant guys, but the boom is not blocked. If the lower pins connecting boom sections are knocked out, the boom can collapse upon workers who are under the boom, resulting in death or serious injuries.

Preventive measures during latticework boom disassembly include:

- Planning boom disassembly location and procedures which are consistent with the manufacturer's instructions
- Using blocking or cribbing on each boom section
- Using one of several types of pins that substantially reduce the risk of crushing
- Posting warnings at pin connections

Appendix C: Hazard Prevention Requirements for Crane Safety

Preconstruction Planning

Most crane accidents could have been easily prevented if the safe use of cranes had been incorporated at the preconstruction planning meeting. The planning stage meeting is the best time to address hazard avoidance. Planning before actual crane operations begin can eliminate major craning hazards from the jobsite and make operations more efficient.

Job Hazard Analysis

Before actual craning operations are begun at the jobsite, a specific job hazard analysis should be conducted to ensure that preconstruction planning is adequate. When prejob planning has been neglected, this on-site job hazard analysis is necessary to ensure that craning operations can be done safely.

Communication

Standard signals to the operator shall be in accordance with the ANSI standard, unless voice communication equipment (telephone, radio, or equivalent) is used. Signals shall be discernible or audible at all times. No response shall be made unless signals are clearly understood.

Hand signals shall be in accordance with Figure 1 and shall be posted conspicuously.

Special signals shall be agreed on in advance by the operator and the signal person and should not be in conflict with standard signals. These special signals are for operations not covered by the hand signals or for special conditions that occur from time to time.

If it is necessary to give instructions to the operator other than provided by the established signal system, the crane motions shall be stopped.

Modes of communication must be agreed upon in preconstruction planning and in the job hazard analysis.

Lifting Capabilities and Load Ratings

During preconstruction planning, lifting requirements should be analyzed by an engineer competent to establish whether the crane to be used has adequate lifting capability. The job hazard analysis should verify that the crane to be used has sufficient boom length for the lift.

All cranes will be marked with the load ratings and loads will not exceed this amount. A load rating chart will be affixed inside the cab of each crane in sight of the operator. Percentage of loads causing tipping are indicated by crane type and design, and maximum limits will not be exceeded.

Appendix C: Hazard Prevention Requirements for Crane Safety (Continued) 2

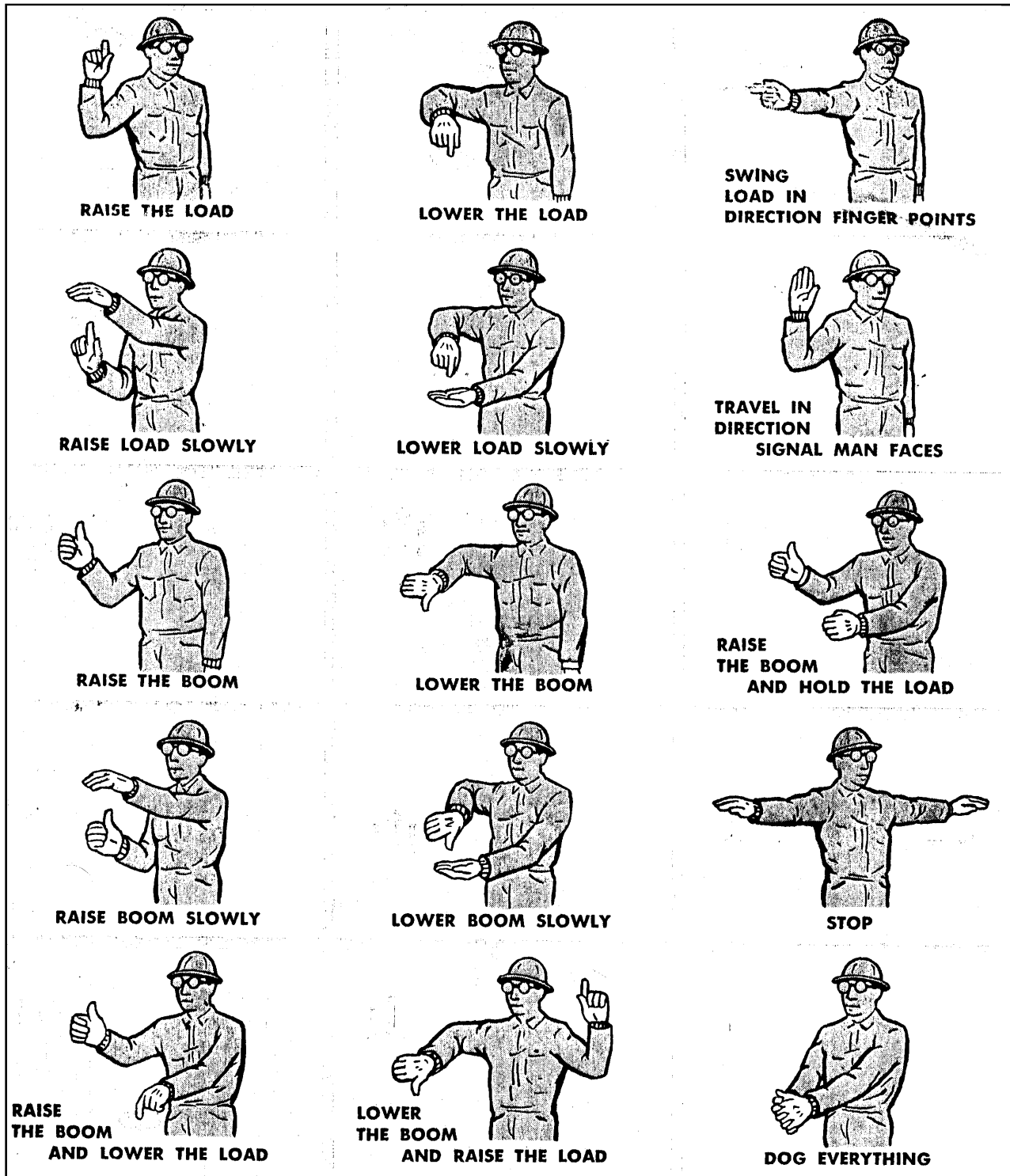


Figure 1

Appendix C: Hazard Prevention Requirements for Crane Safety (Continued) 3

Rigging Practices

The requirements for slings to support loads are well defined in OSHA Standards 29 CFR 1910.184 and the requirements for rigging equipment are defined in 29 CFR 1926.251.

Loads will be moved using slings or other approved devices, not by wrapping the rope around the load.

Controlling and Holding the Load

The use of tag lines to control movement of the load is very important. Normally, when a load is being hoisted, the lay or twist in wire rope causes rotation when the load becomes suspended. OSHA Standard 29 CFR 1910.180(h)(3)(xvi) states: “A tag or restraint line shall be used when rotation of the load is hazardous.”

At no time will the operator be allowed to leave the controls while a load is suspended. Employees will be instructed to stay clear and not to pass under suspended loads.

Ballast or Counterweights

Cranes will not be operated without the full amount of ballast or counterweight in place as specified by the manufacturer, unless the load is significantly lighter than the recommended maximum weight.

Footing

Firm footing, uniformly level to within one percent (1%) should be provided. Where such footing is not otherwise supplied, it should be provided by substantial timbers, cribbing, or other structural members sufficient to distribute the load so as not to exceed the safe bearing capacity of the underlying material.

Rope Inspection and Wire Rope Requirements

All ropes will be inspected for damage each month. Any rope found to be damaged or altered due to stress will be closely monitored for the following warning signs:

- Reduction in rope diameter (stretching) or corrosion
- A number of broken exterior wires
- Worn outside wires
- Corroded or broken wires at the end of connections
- Corroded, cracked, bent, worn, or improperly applied end connections
- Severe kinking, crushing, cutting, or unstranding

Appendix C: Hazard Prevention Requirements for Crane Safety (Continued) 4

It is very important to comply with the crane manufacturer's recommendations for the type of wire rope to be used for various hoist lines or pendants.

Inspection Schedule

New and existing cranes will be inspected each day prior to use. In addition, all cranes will be inspected after any load is dropped or any failure in equipment occurs.

Frequent inspections will be performed on a monthly basis. This inspection will include the following items:

- All control mechanisms
- Any defect detected during operation posing a safety hazard
- All safety devices for proper function
- Leaks in all lines (hydraulic or air)
- Crane hooks
- Rope reeving for non-compliance with manufacturer's recommendations.
- Electrical apparatus for malfunction or signs of deterioration

Periodic inspections will be performed on a semi-annual basis (every six months). This inspection will include the following items:

- Deformed, cracked, or corroded members in the crane structure and boom
- Loose bolts or rivets
- Worn, cracked, or distorted parts such as pins, bearings, shafts, and locking devices
- Excessive wear on brake and clutch system parts, linings, pawls, and locking devices
- Load, boom angle, and other indicators over their full range for damage
- Engines for improper performance and non-compliance
- Wear on chain drive sprockets and excessive chain stretch
- Travel steering, braking, and locking devices
- Tires

Crane inspections will be performed on cranes that have not been used or are idle or used as standby cranes under the frequent crane inspection guidelines.

A notice of the current annual inspection should be posted in the crane. Cranes that cannot be certified must be removed from service until all necessary repairs are made and the equipment is reinspected.

Appendix C: Hazard Prevention Requirements for Crane Safety (Continued) 5

Inspection Records

Inspections will be performed by the supervisor or the designated employee or operator and maintained on hand for a period of three years. These records will include the equipment inspected and the date and signature of the individual who performed the inspection.

Certification records which include the date of inspection, the signature of the person who performed the inspection, and the serial number or other identifier of the crane which was inspected shall be made monthly on critical items in use such as brakes, crane hooks, and ropes.

Transporting Cranes

The following procedures will be observed when transporting cranes from location to location:

- The boom of the vehicle will be carried in line with the direction of travel
- The superstructure will be secured against rotation
- The empty hook will be lashed or otherwise prevented from swinging

Preventive Maintenance

Cranes require on-going service and preventive maintenance. Preventive maintenance programs should be documented according to the crane manufacturer's recommendations.

Materials Handling**SPP# 1910.176****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines to ensure the prevention of injuries when materials are handled and stored either manually or equipment-assisted.

2.0 Scope and Applicability

Materials handling injuries originate in inadequate planning, work location design, scheduling, storage, housekeeping, training, work performance, and equipment selection and use. This safety policy and procedure provides guidelines for the elimination or reduction of injuries due to manual or equipment-assisted materials handling.

This safety policy and procedure includes training provisions, manual materials handling guidelines, requirements for the use of materials handling equipment and

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materials storage. Additionally, It presents guidelines on housekeeping, securing railroad cars, and requirements on labels, signs, and marking.

This document also details the areas of responsibility for the managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within the North Carolina Department of Transportation (NCDOT).

This safety policy and procedure affects any employee who as a result of his or her job duties handles materials.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.176) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.250).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, materials must always be handled such that injuries are eliminated or significantly reduced. When materials handling hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Materials Handling will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation NCDOT's safety policy and procedure on Materials Handling. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Materials Handling.

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6.1 Definitions

Flammable

A material capable of being easily ignited, that burns intensely, or rapidly spreads flames.

Handling

The movement of materials either by manual lifting or mechanical means.

Mechanical Equipment

Fork lifts, cranes, front-end loaders, pallet jacks, backhoes, hand trucks, etc.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Manual Materials Handling
- Materials Handling Equipment
- Storage
- Housekeeping
- Rolling Railroad Cars
- Labels, Signs, and Markings

6.2.1 Training

Training shall be required for employees who manually handle or move materials and for employees who perform equipment assisted materials handling.

This training should be provided prior to employees' assumption of jobs requiring manual handling or equipment assisted handling tasks. This initial training should be based on the discretion of the supervisor and supplemented with refresher training.

Applicable training will include instruction in:

- Proper lifting techniques for manual materials handling
- Available equipment types for equipment assisted materials handling
- Equipment operations for applicable materials handling equipment
- Any special rules or guidelines that may cover specific types of materials handling equipment

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6.2.2 Manual Materials Handling

Manual materials handling involves the handling, moving, lifting, and carrying of materials without the use of mechanical equipment. Minimizing injuries from materials handling requires forethought about these tasks. Some basic materials handling methods include:

- Inspecting materials for slivers, jagged edges, burrs, rough or slippery surfaces
- Getting a firm grip on the object
- Keeping fingers away from pinch points, especially when setting down materials
- Keeping hands away from ends of lumber, pipe, or other long objects, to prevent them from being pinched
- Wiping off greasy, wet, slippery, or dirty objects before trying to handle them
- Keeping hands free from oil and grease

In most cases, gloves, hand leathers, or other hand protectors must be used to prevent hand injuries.

Employees should be physically suited to perform jobs requiring heavy and/or frequent lifting. If a load is thought to be more than one person can handle, 2 employees should be assigned to the operation or materials handling equipment should be provided.

All employees who lift materials will be trained on the proper way to pick up and put down heavy, bulky or long objects. NCDOT's program "Back to Work" and [SPP #1910.001](#) should be consulted for additional details.

All attempts should be made to reduce manual lifting by using mechanical equipment or rearranging the storage of materials.

6.2.3 Materials Handling Equipment

When there is excessive manual handling of materials over 50 pounds, then additional tools and equipment may be required for materials handling.

A variety of tools and equipment is available to assist in the handling of materials. These tools and equipment fall into the following categories:

- Manual Materials Handling Equipment
- Powered Industrial Trucks (rider-operated and walker-operated)
- Hoists
- Rigging

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Manual materials handling equipment is used in NCDOT for a wide variety of tasks. Each of these items should be used only for its designed task and kept in good condition. Selected manual materials handling equipment in NCDOT include:

- Hooks
- Dollies
- Four wheel trucks
- Rollers
- Jacks

Figure 1 presents a illustration of a hand dolly and Figure 2 illustrates a typical four-wheel truck. Appendix A presents details on safe use of these manual materials handling equipment.

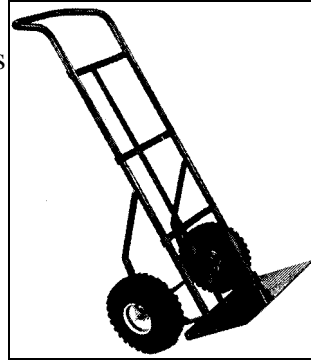


Figure 1



Figure 2

Powered industrial trucks come in two general classifications:

- Rider-operated (mostly forklifts)
- Walker-operated (motorized handtrucks)

Figure 3 illustrates a forklift with its major components and Figure 4 illustrates a walker-operated forklift. Powered industrial trucks are versatile and efficient materials handling equipment, which have eliminated many high risk manual handling tasks.

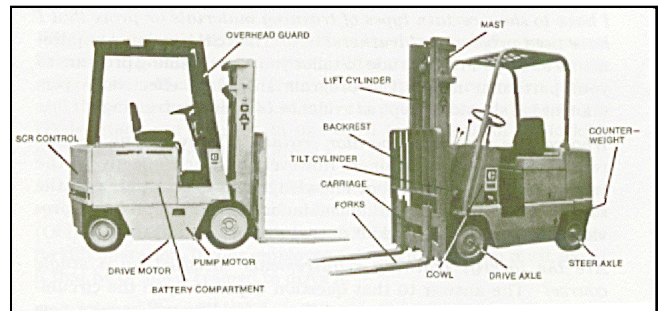


Figure 3

However, inherent in their physical and operational design are potential hazards which can lead to accidents. Occupational injuries involving forklifts or lift trucks are commonplace.

Major reasons for forklift accidents include:

- Improper ventilation and battery charging
- Instability caused by shift in the center of gravity



Figure 4

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- Limited visibility
- Poor communication among employees in the work area
- Inadequate vehicle maintenance
- Using trucks for unsuited tasks

Appendix B presents a checklist to help prevent forklift accidents.

Hoists are used to raise, lower, and transport heavy loads for short distances. They usually range from 1/4 to 2 tons in capacity. Figure 5 illustrates typical hoist configurations. Major factors affecting the safe use of hoists are design and operating conditions, operator skills and knowledge, and proper rigging practices.

Accidents generally associated with hoists are:

- Failure of attachment devices during a lift, resulting in dropped loads
- Collision with persons or objects as a consequence of uncontrolled movement of the hoist or load
- Contacts to personnel in the work area while loads are being attached
- Failure of structural or mechanical parts of hoists during the lifting or moving of loads.
- Lift loads greater than the rated capacity of hoists

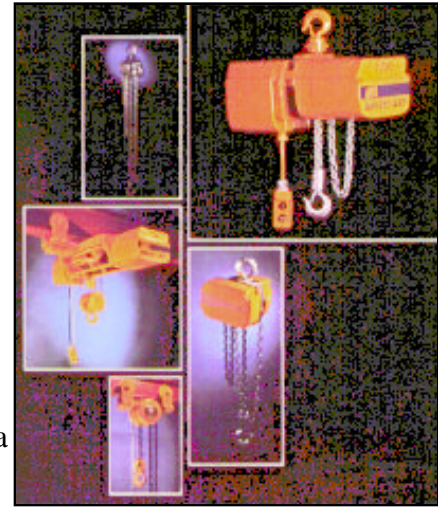


Figure 5

Appendix C presents suggestions for design and operator conditions and operator control to minimize accidents and injuries on hoists. Also, refer to [SPP# 1910.184, Slings](#), for related information on slings and chains.

Rigging is also used to raise, lower, and transport loads. The rigging of loads must be accomplished with relative precision by trained, experienced personnel. To ensure that safe practices are followed, competent supervision must see that:

- Rigging equipment has the capacity for the job
- Rigging equipment is in safe working condition
- Loads are rigged properly
- Rigging crew and other affected personnel maintain safety practices

Refer to [SPP # 1910.184, Slings](#), for related rigging information on slings and chains.

6.2.4 Storage

Planning for materials storage reduces the handling required to move materials and articles for processing, use, or shipment. Material movement is

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facilitated by adequate storage space at receiving, processing, and shipping areas. Long-and short-term storage should be considered to reduce hazards and to facilitate the placement and removal of materials.

Storage equipment (racks, bins, pallets, etc.) should match the materials to be temporarily held or stocked. Bags, bundles, and other containers should be properly stacked, blocked, interlocked, and limited in height. For open pits, tanks, vats, etc., covers and guardrails must be provided to reduce contact and fall hazards.

Special precautions are required for the storage of hazardous and flammable materials. Refer to [SPP # 1910.106, Flammable and Combustible Liquids](#), for additional details on hazardous and flammable storage requirements. Also see [SPP# 1910.109, Explosives](#), for details on explosives storage requirements. The level of precaution should match the potential for injury posed by particular substances.

Appendix D presents detailed storage guidelines on:

- Warehouse Storage
- Open Yard Storage
- Lumber
- Bagged Material
- Pipe and Bar Stock
- Sheet Metal
- Brick and Masonry Blocks

6.2.5 Housekeeping

Storage areas will be free from excess materials that create hazards that result in fire, explosion, slips, trips, or infestation by insects or rodents. Weeds and other vegetation must be controlled by cutting or using herbicides when necessary.

6.2.6 Rolling Railroad Cars

Derail and/or bumper blocks will be provided on spur railroad tracks to prevent a runaway rail car from entering a work area, striking a building, or making contact with another rail car being loaded or unloaded.

6.2.7 Aisles and Passageways

Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard.

Permanent aisles and passageways shall be appropriately marked. Additionally, clearance signs and warning of clearance limits shall be posted. Equipment will be marked indicating the working load it will safely support.

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6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase and repair of materials handling equipment and storage facilities in their areas. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will audit for compliance with this safety policy and procedure during their facility and jobsite audits. Appendices E and F present sample forms for performing facilities and jobsite audits.

Supervisors will ensure employees are provided with Personal Protective Equipment (PPE) as necessary for their job.

Supervisors will evaluate, note, and correct any deficiencies observed in materials storage and handling equipment and practices while conducting facility and job site audits.

Supervisors are responsible for ensuring that only employees trained and qualified will operate materials handling equipment.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees are responsible for requesting/selecting the appropriate materials handling equipment for the task to be performed.

Employees are responsible for performing daily pre-shift checks to ensure the safe operation of materials handling equipment.

Employees will report all defective equipment to their supervisors.

SAFETY POLICY & PROCEDURE

Employees must report any observed unsafe act or condition relating to materials storage and handling to their immediate supervisor.

Employees will attend training on the proper way to handle and store materials specific to their operation. This may also include mechanical equipment training.

Employees will place materials only in the area designated for such storage.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased material handling equipment complies with current safety regulations.

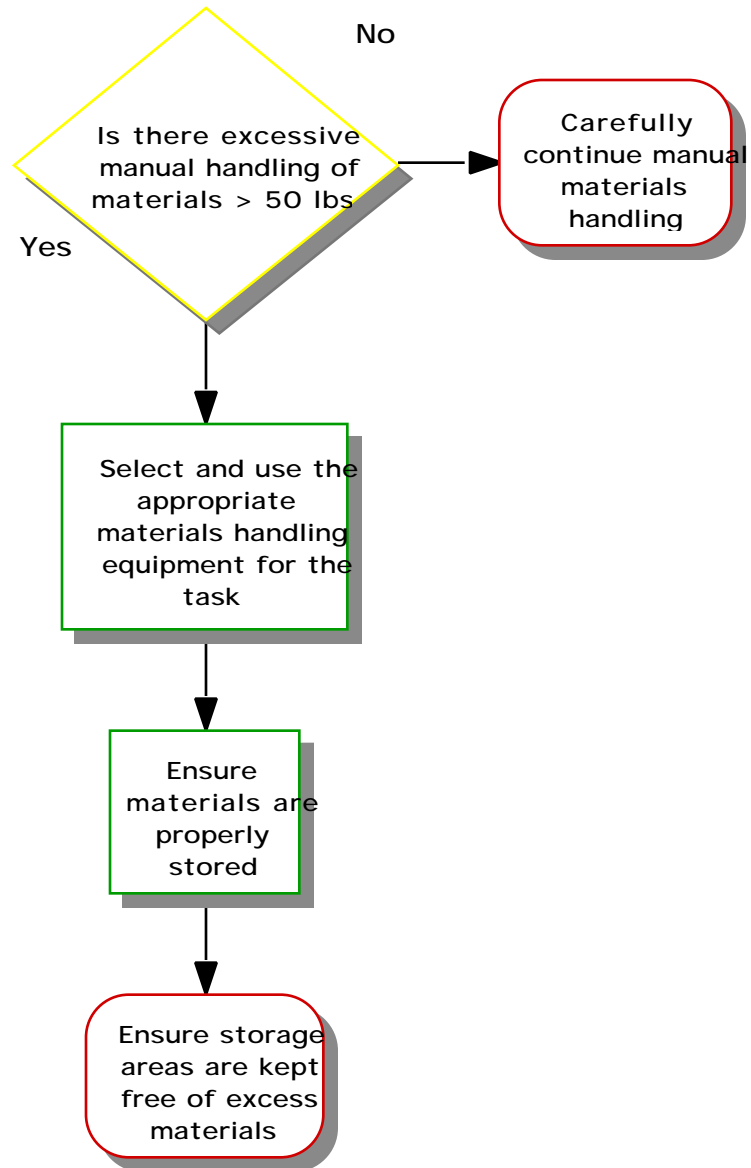
Safety and Loss Control will periodically inspect and report to supervisors any deficiencies observed that relate to material handling and storage in facilities or job sites.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will support Divisions/Units with the selection and purchase of mechanical equipment necessary to move stored materials.

Materials Handling Flowchart



APPENDIX A: Manual Handling Equipment Guidelines

Bars

Remember to position your body to avoid materials which may slip or fall.

Dollies

Load materials evenly on dollies to prevent tipping and view obstruction. Push rather than pull dollies, unless specially designed to be pulled.

Hooks

Hooks should be used in a manner so as not to glance off hard objects. Store hooks in a safe place and maintain them in a ready to use condition.

Jacks

Use a jack properly rated for the load. Place the jack on a level, stable, and clean surface. Avoid metal-to-metal contact (jack to surface being lifted) by using wooden shims. Block the load after the jack lift.

Rollers

Keep hands and feet away from pinch points and make sure that rollers extend beyond the load.

Two wheel trucks

Select trucks with widely spaced wheels to prevent overloading. Use knuckle guards to protect hands from contact. Make sure that hand trucks are in a vertical position when not in use.

SAFETY POLICY & PROCEDURE

APPENDIX B: Forklift (Lift Truck) Accident Prevention Checklist

YES NO

System Evaluation

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Operators Trained? |
| <input type="checkbox"/> | <input type="checkbox"/> | Production speed evaluated? |
| <input type="checkbox"/> | <input type="checkbox"/> | Trucks properly maintained? |
| <input type="checkbox"/> | <input type="checkbox"/> | Drivers' skills/trucks matched? |
| <input type="checkbox"/> | <input type="checkbox"/> | Truck tools/attachments/accessories available? |
| <input type="checkbox"/> | <input type="checkbox"/> | Age/Condition of trucks considered? |

Operational Requirements

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Operating speed controlled? |
| <input type="checkbox"/> | <input type="checkbox"/> | Proper loading practices? |
| <input type="checkbox"/> | <input type="checkbox"/> | Alerting workers of trucks' presence? |
| <input type="checkbox"/> | <input type="checkbox"/> | Proper backing/turning? |
| <input type="checkbox"/> | <input type="checkbox"/> | Proper lifting practices? |
| <input type="checkbox"/> | <input type="checkbox"/> | Prohibiting unauthorized operators/riders? |
| <input type="checkbox"/> | <input type="checkbox"/> | Communication with co-workers while performing shared tasks? |
| <input type="checkbox"/> | <input type="checkbox"/> | General attentive operation? |
| <input type="checkbox"/> | <input type="checkbox"/> | Servicing of trucks? |
| <input type="checkbox"/> | <input type="checkbox"/> | Blocking wheels on semitrailers/railroad cars? |
| <input type="checkbox"/> | <input type="checkbox"/> | General prohibition of unsafe behavior? |
| <input type="checkbox"/> | <input type="checkbox"/> | Parking of trucks? |

Worksite Characteristics

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Sufficient width of travel lanes? |
| <input type="checkbox"/> | <input type="checkbox"/> | Travel lanes uncluttered? |
| <input type="checkbox"/> | <input type="checkbox"/> | Visibility/warnings at intersections/doors? |
| <input type="checkbox"/> | <input type="checkbox"/> | Environmental conditions considered (noise, fumes, gases, dusts, lighting)? |
| <input type="checkbox"/> | <input type="checkbox"/> | Restriction of personnel in travel lanes? |
| <input type="checkbox"/> | <input type="checkbox"/> | Traffic patterns controlled? |
| <input type="checkbox"/> | <input type="checkbox"/> | Driving on level/nonslippery surfaces? |

Load Characteristics

- | | | |
|--------------------------|--------------------------|---------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | Proper palleting? |
| <input type="checkbox"/> | <input type="checkbox"/> | Weight of loads? |
| <input type="checkbox"/> | <input type="checkbox"/> | Condition of pallets and skids? |
| <input type="checkbox"/> | <input type="checkbox"/> | Stable loads/good visibility? |

SAFETY POLICY & PROCEDURE

Appendix B: Forklift (Lift Truck) Accident Prevention Checklist (Continued) 2

Truck Condition

YES NO

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Are the following items in good repair, and/or in good condition, and have good design characteristics:

Brakes?

☐ ☐

Transmission, clutch, and shift linkage?

☐ ☐

Mirrors with unobstructed vision?

☐ ☐

Operating controls?

☐ ☐

Steering?

☐ ☐

Minimal leaks (hydraulic, gas, oil, transmission, brakes)?

☐ ☐

Operation of safety features?

☐ ☐

Acceptable emissions from truck?

APPENDIX C: Hoist Safe Use Recommendations

Design and Operating Conditions

- Supply hoists specifically designed to handle the maximum anticipated loads. Require the posting of safe load capacity charts and safe operating procedure on each hoist.
- Confirm that all hoists are properly installed and tested prior to initial use. Make certain that hoist supports have an adequate design factor for the maximum loads to be imposed (including the weight of hoists and rigging).
- Place hoists in a reasonably unobstructed area and away from personnel traffic areas. Do not allow workers under loads during any lift or movement.
- Perform regular inspection, testing, maintenance, and needed repair.
- Authorize only trained and experienced personnel to operate hoists, conduct hitching (rigging), and give load lift and movement signals.

Operator Control

- Inspect and test hoist operating systems, including transport, controls, limit switches, hoist ropes and chains, and brake functions.
- Determine the weight of the load to be lifted keeping within structural and stability limitations.
- Make sure that the hoist and load hitch are centered above the load.
- Ensure that load attachments are secure and within capacity prior to the lift.
- Select in advance the load travel path, paying particular attention to personnel and fixed obstacles.
- Check to be certain that rigging and signaling personnel and others are away from the load when it is being lifted or moved.
- Make smooth lifts and movements of loads; avoid abrupt movements which may cause a load to fall.
- Report all equipment, structural, or functional problems.
- Have regular inspections, testing, lubrication, maintenance, and repairs performed.

APPENDIX D: Materials Storage Guidelines

Warehouse Storage

When planning materials storage, make sure materials do not obstruct fire alarm boxes, sprinkler system controls, sprinkler heads, fire extinguishers, first-aid equipment, lights, and electric switches. All exits and aisles must be kept clear at all times and shall be appropriately marked.

No Smoking signs must be posted where necessary throughout the warehouses.

Maximum safe load limits of floors within buildings and structures, in pounds per square foot, shall be conspicuously posted in all storage areas, except for floors or slabs on grade. Maximum safe loads shall not be exceeded.

Open Yard Storage

Plan open yard storage to have driveways between and around combustible storage piles at least 15 feet wide and maintained free from accumulation of rubbish, equipment, or other materials. Driveways should be spaced so that a maximum grid system unit of 50 feet is produced. Combustible materials must be piled with due regard to the stability of piles and no higher than 20 feet.

Lumber

For outdoor storage of lumber, firm ground without yielding soil must be selected. The area must be well-drained to remove surface water and prevent softening of the ground. A periodic check should be made to determine if there is any shifting of materials.

For long-time piling, substantial bearings or dunnage is recommended. Concrete with spread footing extending below the frost line is a good method.

For temporary piling, heavy timbers may be used to support the cross-pieces. This type of support must be inspected periodically for deterioration which may cause the pile to list dangerously.

If lumber must be moved manually to or from a higher pile, the pile must be not more than 16 feet high and safe means of access to the top, such as a ladder, must be provided. Tie pieces are needed not only to stabilize the pile, but also to provide air circulation. Tie pieces must not extend into walkways, but are to be cut flush with the pile.

APPENDIX D: Materials Storage Guideline (Continued) 2

Bagged Material

Bagged material must be cross-tied with the mouths of the bags toward the inside of the pile. When the pile is 5 feet high, it must be stepped back one row for each additional 3 feet of height. A pile of sacks must never be undermined by the removal of sacks from lower rows.

Pipes and Bar Stock

Pipes and bar stock must be stored on specially designed skills or racks and shall be safely blocked to prevent rolling or spreading. When moving these materials, employees should work from the end of the pile as much as possible. Employees must be instructed never to attempt to stop rolling or sliding pipes or bar stock.

Sheet Metal

Sheet metal must be handled with hand leathers, leather gloves or gloves with metal inserts. All bundles must be separated by strips of wood to facilitate handling when the material is needed for production and to lessen chances of shifting or sliding of the piles of material.

Brick and Masonry Blocks

Brick stacks shall not be more than 7 feet in height. When a loose brick stack reaches a height of 4 feet, it must be tapered back 2 inches in every foot of height above the 4-foot level.

Brick must never be stacked for storage purposes on scaffolds or runways. This does not prohibit normal supplies on bricklayers' scaffolds during actual bricklaying operations.

Masonry blocks should be limited to a stacked pile height of 6 feet. If blocks are stacked higher than 6 feet, the stack shall be tapered back one-half block per tier above the 6-foot level.

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APPENDIX E: Facility Handling and Storage Checklist

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	General Requirements
<input type="checkbox"/>	<input type="checkbox"/>	• Are fire alarm boxes, sprinklers, sprinkler system controls, fire extinguishers, first-aid equipment, lights, electrical switches and fuse boxes blocked by stored materials?
<input type="checkbox"/>	<input type="checkbox"/>	• Are non-compatible materials stored in separate locations? (Example: Corrosives stored away from metal containers of combustible liquids.)
<input type="checkbox"/>	<input type="checkbox"/>	• Are all aisles and passageways in good repair and free from obstacles that stretch across or in the path of employees or equipment?
<input type="checkbox"/>	<input type="checkbox"/>	• Are permanent aisles and passageways marked with white lines?
<input type="checkbox"/>	<input type="checkbox"/>	• Are exits free from obstacles and stored materials? (Check the exterior of the building to ensure that exit doors are not blocked by equipment or stored materials.)
<input type="checkbox"/>	<input type="checkbox"/>	• Are ramps available to ensure the safe movement of equipment between two working levels?

Clearances

<input type="checkbox"/>	<input type="checkbox"/>	• Is there a minimum clearance of 18 inches available between nonflammable stored materials and sprinkler heads?
<input type="checkbox"/>	<input type="checkbox"/>	• Is there a minimum clearance of 36 inches available between flammable stored materials and sprinkler heads?
<input type="checkbox"/>	<input type="checkbox"/>	• Are passageways and/or aisles at least 3 feet wider than the widest equipment used to move stored materials?
<input type="checkbox"/>	<input type="checkbox"/>	• Are material stacks over 5 feet high stepped back an additional row for each additional 3 feet in height of material?
<input type="checkbox"/>	<input type="checkbox"/>	• Are clearance heights posted and visible to equipment operators?

Employee Behavior

<input type="checkbox"/>	<input type="checkbox"/>	• Are employees storing materials in the correct locations, using the proper equipment, and following safe operating procedures?
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SAFETY POLICY & PROCEDURE

APPENDIX F: Job Site/Yard Evaluation Checklist

Yes No

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General

- Is the jobsite neat and orderly?
- Are materials stored in tiers, secured by blocks, interlocking or other means suitable to prevent the stack from sliding, falling or collapsing?
- Are employees working in silos, hoppers, tanks or other similar areas trained in Confined Space Entry?
- Is vegetation controlled by mowing or by using herbicide?
- Is space provided between stockpiled materials to allow equipment and/or personnel to safely access materials?

Pipe Storage

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- Are stockpiles of pipe stored in pyramid stacks? (Stack heights shall be limited to 6 feet.)
- Are pipe stacks secured from spreading by blocks or other similar restraining methods? (Blocking shall be done after the first course of pipe is placed.)
- Are employees allowed to stand on the stack or around the base of the stack while equipment is placing or removing materials from the stockpile?

Masonry Storage

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- Are brick bundles stacked by mechanical equipment limited to 7 feet?
- Are loose brick stacked above 4 feet stepped back 2 inches for every additional 1 foot of height?
- Are blocks stacked above 6 feet stepped back by 1/2 block for every additional row over 6 feet?
- Are bricks or blocks stored for long periods on scaffolding?

Lumber

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- Are all nails removed from used lumber before being stockpiled?
- Are lumber stockpiles below 16 feet in height?
- Are lumber stockpiles secured by blocks or interlocking to prevent the pile from tilting or collapsing?

SAFETY POLICY & PROCEDURE

APPENDIX F: Job Site/Yard Evaluation Checklist (Continued) 2

Straw Bails

- | Yes | No | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | • Are straw bales tiered, interlocked, and secured to prevent the materials from spreading or collapsing? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Are straw bales stored in partially open or well-ventilated facilities to prevent the explosion of dust particles? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Are straw bales stored at least 3 feet from any electrical outlet or light fixture? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Are No Smoking or Open Flame signs posted around the perimeter of the facility storing hay bales? |

Rim Wheels**SPP# 1910.177****Quick Reference**

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1.0 Purpose

The purpose of this safety and procedure is to establish guidelines and accountability for servicing Rim Wheels. Through implementation of this safety policy and procedure, injuries to North Carolina Department of Transportation (NCDOT) employees can be prevented.

2.0 Scope and Applicability

Rim wheels are an assemblage of tire, tube, and wheel components that are installed on NCDOT vehicles. If certain precautions are not followed, explosive separation or the sudden release of pressurized air may propel projectiles of rim wheel components. The number of workers exposed to tire and rim related hazards is increasing as NCDOT continues to add to its fleet of motor vehicles and rubber-tired equipment.

This safety policy and procedure provides guidelines for servicing rim wheels by identifying training, equipment, and procedures to be used by NCDOT employees who service multi-piece and single-piece rim wheels.

SAFETY POLICY & PROCEDURE

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control, within NCDOT.

This safety policy and procedure affects employees in the equipment shops who service single or multiple rim wheels.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.177).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all NCDOT employees who service Rim Wheels will be furnished with the equipment, tools and training necessary to safely perform their duties. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Rim Wheels will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Rim Wheels. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's safety policy and procedure on Rim Wheels.

6.1 Definitions

Barrier

A fence, wall, or other structure placed between a single piece wheel and an employee during tire inflation that can contain the rim wheel components in the event of sudden release of the contained air in the single piece rim wheel.

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Charts

Posters that are available from the United States Department of Labor, Occupational Safety and Health Administration, titled, "Dismounting and Mounting Procedures for Truck/Bus Tires," or from the National Highway Traffic Safety Administration (NHTSA) titled, "Dismounting and Mounting Procedures Truck/Bus Tires" and "Multi-Piece Rim Matching Chart," or any other poster which contains at least the same instructions, safety precautions, and other information contained in the charts that is applicable to the types of wheels being serviced.

Installing and Removing

The transfer and attachment of an assembled rim wheel onto a vehicle axle hub. Removal means the opposite.

Multi-Piece Rim Wheel

A wheel consisting of two or more parts, one of which is a side-locking ring designed to hold the tire on the wheel by interlocking components when the tire is inflated.

Restraining Device

An apparatus such as a cage, rack assemblage of bars, and other components that will contain all rim wheel components during the sudden release of the contained air of single piece rim wheel.

Rim Manual

A publication containing instructions from the manufacturer or other qualified organization for correct mounting, dismounting, maintenance, and safety precautions specific to the type of wheel being serviced.

Rim Wheel

An assemblage of tire, tube, and liner (where appropriate) and wheel components.

Service Area

That part of an employer's premises used for the servicing of rim wheels or any other place where an employee services rim wheels.

Service or Servicing

The mounting and dismounting of rim wheels and related activities such as inflating deflating, installing, removing, and handling.

Single-Piece Rim Wheel

The assemblage of single piece rim wheel with the tire and other components.

Single Piece Wheel

A vehicle wheel consisting of one part, designed to hold the tire on the wheel when the tire is inflated.

Trajectory

Any potential path or route that a rim wheel component may travel during an explosion separation or the sudden release of the pressurized air, or an area at which

SAFETY POLICY & PROCEDURE

an airblast from a single piece rim may be released. The trajectory may deviate from paths which are perpendicular to the assembled position of the rim wheel at the time of separation or explosion.

Wheel

That portion of a rim wheel which provides the method of attachment of the assembly to the axle of a vehicle and also provides the means to contain the inflated portion of the assembly (i.e., the tire and/or tube).

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Tire Restraining Device (Cage)
- Air-Line Assembly
- Charts and Rim Manuals
- Tools
- Wheel Component Acceptability
- Safe Operating Procedure

6.2.1 Training

All employees who service multi-piece and single-piece rim wheels shall be trained in and be able to demonstrate the following:

- The hazards involved in servicing rim wheels
- The correct procedure to follow for the specific rim wheel type being serviced
- How to use the restraining device (cage) and inspect it for damage that would remove it from service
- The type of air line assembly required to remain outside of the trajectory

Refresher training shall be provided at the discretion of the supervisor. Appendix A presents a checklist for tire safety training.

6.2.2 Tire Restraining or Barrier Device (Cage)

A restraining device (cage) capable of withstanding 150% of the maximum tire specification pressure for the type of rim wheel being serviced will be provided. This cage will be capable of containing all parts of the tire or rim in the event of an explosion or separation. The maximum tire specification should be conspicuously posted on this equipment.

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All restraining devices shall be inspected prior to each day's use or after any explosion or separation. If inspection of the cage reveals any of the following defects it must be removed from service immediately:

- Cracked welds
- Bent components that alter the structural integrity or ability of the cage to contain exploding rim or tire parts
- Pitting of components due to corrosion

Restraining devices or cages removed from service may not be used until repairs have been made and the cage has been reinspected. Component replacement or welding of structural members must be certified by the manufacturer or a Registered Professional Engineer before it may be returned to service.

6.2.3 Air-Line Assembly

An air-line assembly consisting of the following components must be used when inflating tires:

- A clip-on chuck
- An in-line valve with a pressure gauge or a pre-set regulator
- A sufficient length of hose between the clip-on chuck and the in-line valve to allow the employee to stand outside the trajectory

6.2.4 Charts and Rim Manuals

Current charts or rim manuals containing instruction for the type of wheels being serviced shall be available in the service area.

6.2.5 Tools

Only tools recommended in the rim manual for the type of wheel being serviced are to be used when servicing rim wheels.

6.2.6 Wheel Component Acceptability

Multi-piece wheel components shall not be interchanged except as provided in the charts or in the applicable rim manual.

Multi-piece wheel components and single-piece wheels shall be inspected prior to assembly. Any wheel or wheel component which is bent out of shape, pitted from corrosion, or broken or cracked shall be tagged out of service and removed from the service area. Damaged or leaky valves shall be replaced as well.

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Prior to mounting and inflation the following items shall be cleaned and free from any dirt, surface rust, scale, loose or flaked rubber:

- Rim Flanges
- Rim Gutters
- Rings
- Bead seating surfaces
- Bead areas of tires

The size (bead diameter and tire/wheel widths) and type of both the tire and the wheel shall be checked for compatibility prior to assembly of the rim wheel.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of equipment, tools, and training necessary to service rim wheels in their areas. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors. They are also responsible for conducting employee training and coordinating any additional training needs through their managers/unit heads.

Supervisors will audit for compliance with this safety policy and procedure during their Facility and Jobsite Audits. Supervisors will periodically inspect restraining devices, air-line assemblies, and tools as well as check for the availability of posted rim charts and rim manuals during facility and work site audits.

Supervisors will ensure that employees are provided with PPE as necessary for their job.

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6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees will attend training on safe operating procedure for servicing multi-piece and single-piece rim wheels.

Employees will wear all the required PPE when servicing rim wheels.

Employees must report any suspected damage to restraining devices (cages) as well as report any tire explosion or separation within the restraining devices.

Employees must follow the safe operating procedure for servicing rim wheels.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased rim wheel service equipment comply with current safety regulations and this safety policy and procedure.

Safety and Loss Control will periodically inspect and report to supervisors any deficiencies found in the restraining devices, air-line assemblies, tools, rim charts, rim manuals, and procedures for servicing rim wheels.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will ensure that restraining devices acquired by NCDOT will meet the specifications required in this safety policy and procedure.

Central Equipment Unit will support Divisions/Units with the selection, purchase, and modification of restraining devices, air-line assemblies, and tools necessary to service rim wheels.

Central Equipment Unit will maintain training videos from tire rim manufacturers as well as rim wheel manuals for reference guides.

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Central Equipment Unit will perform Rim Wheel training in conjunction with Safety and Loss Control at the request of managers/unit heads.

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APPENDIX A: Checklist for Tire Safety Training Compliance

Equipment Shop: _____

Employee's Name: _____

Social Security #: _____

Has the OSHA-required training been completed in the following categories?

Topic covered under 1910.177	Completion Date	Trainer's/Supervisor's Signature	Employee's Initial
Rim Wheel Hazards			
Safety Procedures			
Procedure for Tire Wheel			
Safe Operating Procedures			
Chart Data			
OSHA Reg. 1910.177			

Employee demonstrates
and maintains ability
to service rim wheels
and to perform the
following tasks safely

Completion Date	Trainer's/ Supervisor's Signature	Employee's Initial
Dismounting tires includes deflation		
Inspect and identify rim wheel components		
Mounting tires includes inflation with restraining device and other equipment		
Use of restraining device or barrier and other equipment		
Handling of rim wheels		
Inflating a tire when a 1-piece rim wheel is mounted on a vehicle		
Installation and removal of rim wheels		
Employee demonstrates an understanding of the necessity to stand out of the trajectory both during inflation and inspection of rim wheels after inflation		

Slings

SPP# 1910.184

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1.0 Purpose

The purpose of this safety policy and procedure is to establish the methods and guidelines for the safe use of slings throughout the North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Slings, a component of hoisting and rigging systems, are used to lift and move loads. In NCDOT, alloy steel chain, wire rope, natural and synthetic fiber rope, and synthetic web slings are typically used. Slings are capable of lifting tremendous loads.

This safety policy and procedure provides guidelines for implementing an effective safe sling use program. It includes provisions for training, recognizing the types of slings used in NCDOT, understanding the attachments used with slings, and inspecting slings. Additionally, it presents information on sling repair requirements and subsequent removal from service.

SAFETY POLICY & PROCEDURE

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any employee who uses slings and sling products to lift, secure, and move loads.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.184).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, to minimize and eliminate material lifting hazards, properly rated slings that are not damaged or defective will be used in NCDOT. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Slings will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Slings. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition of equipment to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Slings.

6.1 Definitions

Angle of Loading

The inclination of a leg or branch of a sling measured from the horizontal or vertical plane.

Basket Hitch

A sling configuration whereby the sling is passed under the load and has both ends, end attachments, eyes or handles on the hook or a single master link.

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Braided Wire Rope

A wire rope formed by plaiting component wire ropes.

Bridle Wire Rope Slings

A sling composed of multiple wire rope legs with the top ends gathered in a fitting that goes over the lifting hook.

Cable-Laid Endless Sling - Mechanical Joint

A wire rope sling made endless by joining the ends of a single length of cable-laid rope with one or more metallic fittings.

Cable-Laid Grommet - Hand-Tucked

An endless wire rope sling made from one length of rope wrapped six times around a core formed by hand-tucking the ends of the rope inside the six wraps.

Cable-Laid Rope

A wire rope composed of six wire ropes wrapped around a fiber or wire rope core.

Cable-Laid Rope Sling - Mechanical Joint

A wire rope sling made from a cable laid rope with eyes fabricated by pressing or swagging one or more metal sleeves over the rope junction.

Choker Hitch

A sling configuration with one end of the sling passing under the load and through an end attachment, handle or eye on the other end of the sling.

Coating

An elastomer or other suitable material applied to a sling or to a sling component to impart desirable properties.

Designated Person

A selected or assigned employee who is qualified to perform specific duties.

Equivalent Entity

A person or organization (NCDOT) which by possession of equipment, technical knowledge, and skills can perform with equal competence the same repairs and tests as the person or organization with which it is equated.

Female Handle

A handle with an eye and a slot of such dimension as to permit passage of a male handle thereby allowing the use of a metal mesh sling in a choker hitch.

Handle

A terminal fitting to which metal mesh fabric is attached.

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Handle Eye

An opening in a handle of a metal mesh sling shaped to accept a hook, shackle or other lifting device.

Hitch

A sling configuration whereby the sling is fastened to an object or load either directly to it or around it.

Link

A single link of chain.

Male Handle

A handle with a handle eye.

Master Coupling Link

An alloy steel welded coupling link used as an intermediate link to join alloy steel chain to master links.

Master Link

A forged or welded steel link used to support all members (legs) of an alloy steel chain sling or wire rope sling.

Mechanical Coupling Link

A non-welded mechanically closed steel link is used to attach master links or hooks to alloy steel chain.

Proof Load

The load applied to test strength of equipment.

Proof Test

A nondestructive tension test performed by the sling manufacturer or an equivalent entity to verify construction and workmanship of a sling.

Rated Capacity

The working load limit or the maximum load to which equipment will be subjected.

Reach

The effective length of an alloy steel chain sling measured from the top bearing surface of the upper terminal component to the bottom bearing surface of the lower terminal component.

Selvage Edge

The finished edge of synthetic webbing designed to prevent unraveling.

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Sling

An assembly which connects the load to the material handling equipment.

Sling Manufacturer

A person or organization that assembles sling components into their final form for sale to users.

Strand-Laid Rope

A wire rope made with six or eight strands wrapped around a fiber core, wire strand core, or independent wire rope core.

Vertical Hitch

A method of supporting a load by a single vertical part or leg of the sling.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Slings
- Attachments
- Inspections
- Repairs
- Removal from Service

6.2.1 Training

Employees who use slings will be trained in:

- Types of slings
- Applications and limitations of the various types of slings
- Inspection procedures for slings
- Removal of slings from service

These employees will be trained upon initial employment or upon new job assignment. Subsequent training will be determined by employee's supervisor.

6.2.2 Slings

Several types of slings are used throughout NCDOT and include:

- Alloy Steel Chain Slings
- Wire Rope Slings
- Natural and Synthetic Fiber Rope Slings
- Synthetic Web Slings

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Sling selection for a particular task is based on:

- Rated capacity of the sling
- Nature of the task
- Amount of weight required to be lifted, hoisted or moved

The user should determine that the sling is being used in accordance with rated capacity as listed in the manufacturer's catalog. See Appendix A for slings' safe operating practices.

The alloy steel chain, wire rope and fiber rope slings are typically used where sling damage to the load is not critical. Synthetic web slings are ideal where sling damage to a load is not acceptable.

Alloy chain slings will have permanent identification affixed to the sling indicating the size, grade, rated capacity, and reach of the sling. Untagged slings will be removed from service. Alloy steel chains and chain slings should not be heated above 600 degrees after being received from the manufacturer.

Wire rope slings are illustrated in Figure 1. They must be proof-tested by the manufacturer to ensure quality. A certificate verifying rated capacity will accompany each wire rope sling. This certificate will be available for review.

The natural and synthetic fiber rope slings are

other alternative materials that combine strength with ease of handling. If splices are used in natural and synthetic fiber rope slings, several design requirements have to be met. See Appendix B for details.

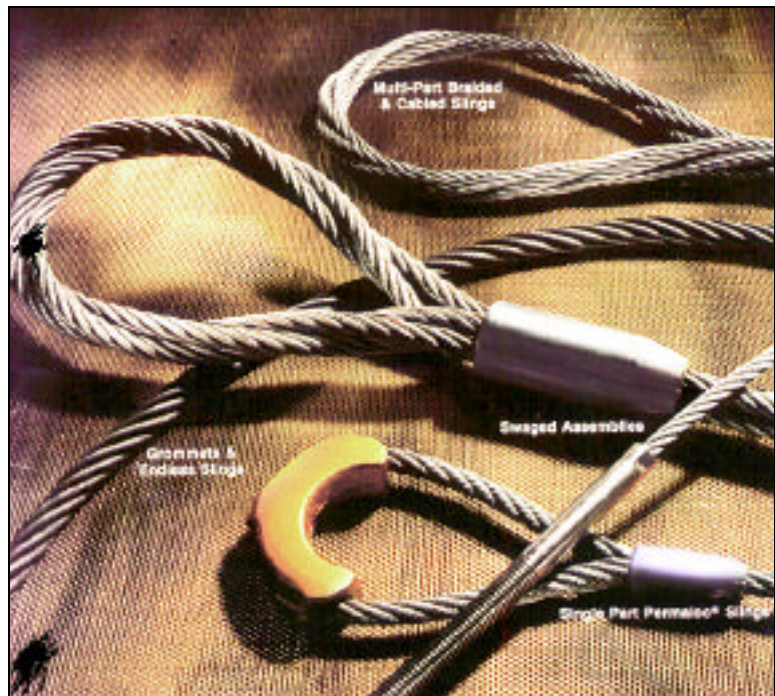


Figure 1

Synthetic web slings are illustrated in Figure 2. They must be marked or coded to show the rated capacities for each type of hitch, type of web

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material, and manufacturer. Additionally, synthetic web slings must not be exposed to fumes, vapors, sprays, mists, liquid acids, liquid phenolics, or liquid caustics.



Figure 2

6.2.3 Attachments

All attachments including hooks, rings, oblong links, pear shaped links, and welded link components will be rated at least at the capacity of the sling itself. Makeshift links or other shop fabricated attachments will not be used. Slings twisted more than 10 degrees from the plane of the unbent hook will not be used.

6.2.4 Inspections

Slings will be inspected each day prior to use. Any visual defect will be reported. Damaged slings will not be used. In severe conditions (e.g., temperature, corrosion, etc.), slings will be inspected throughout the day.

Alloy chain slings will be inspected every six months by a supervisor or designated employee for wear and defects in composition and welds. This inspection will consider not only the physical aspects, but also the total service life of the slings. This inspection will be recorded and maintained on file with the date of the inspection and name and signature of the employee performing the inspection.

Appendices C through F present inspection procedures and forms for wire rope, wire rope slings, chains, and chain slings. These detailed procedures and forms provide an effective way to inspect and document the condition of slings in your facilities.

6.2.5 Sling Repair

Slings must be in good condition and not damaged or defective to ensure safe and reliable use. If slings are worn, damaged or defective they shall not be used. If the slings are believed to be repairable, then those slings will be

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returned to the sling manufacturer for repairs. The manufacturer must proof-test all repaired slings before they are accepted for reuse. Under no circumstances will employees attempt to repair slings for reuse.

Broken links or attachments on steel alloy chain slings will not be repaired using mechanical coupling links. Additionally, any sling with temporary repairs will not be used.

6.2.6 Removal From Service

If slings are damaged or defective, they shall not be used. Until repairs are made on defective or damaged slings, they will be removed from service. If these slings are not repairable, they will be permanently removed from service. Appendix G lists the conditions that must be present to remove any sling from service.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring adequate funds are available for the purchase of chains and slings for their areas.

They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also audit their safe sling use program to ensure effective implementation with this safety policy and procedure.

6.3.2 Supervisors

Every six months, supervisors or a designated employee will inspect all slings in their work area for wear and for defects in composition and welds. Supervisors will ensure that defective or damaged slings are removed from service.

Supervisors will also ensure that employees are provided with the appropriate Personal Protective Equipment (PPE) as necessary for their job (e.g., foot, hand, or eye protection as necessary).

6.3.3 Employees

Employees shall comply with all applicable training. Additionally, employees shall report all damaged slings and/or unsafe conditions to their supervisors.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Additionally, Safety and Loss Control will assist in developing or securing the required training.

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Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased slings comply with this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure the safe use of slings.

6.3.5 Central Equipment Unit

Central Equipment unit shall maintain an adequate supply of appropriate slings. Central Equipment Unit will ensure that all components are delivered with the appropriate manufacturer's certification.

APPENDIX A: Safe Sling Operation

The following procedures will be followed when using Slings:

- Slings damaged or defective will be removed from service.
- Slings will not be shortened with knots or bolts or other makeshift devices.
- Sling legs will not be kinked.
- Slings will not be loaded beyond their rated capacity.
- Slings used in a basket hitch will have the loads balanced to prevent slippage.
- Slings will be securely attached to their loads.
- Slings will be padded or protected from the sharp edges of loads.
- Suspended loads will be kept clear of obstructions.
- All employees will be kept clear of loads about to be lifted and of suspended loads.
- Hands or fingers will be kept clear of loads and not placed between the load and the strap.
- Shock loading will not be allowed.
- Slings will not be removed while loads are resting on the sling.

APPENDIX B: Natural and Synthetic Fiber Rope Slings Splices

The use of natural and synthetic fiber rope slings utilizing splices will not be used unless the following requirements for design are met:

- In manila rope, eye splices will consist of at least three full tucks, and short splices will consist of at least six full tucks, three on each side of the splice center line.
- In synthetic rope, eye splices will consist of at least four full tucks, and short splices will consist of at least eight full tucks, four on each side of the center line.
- Strand end tails will not be trimmed flush with the surface of the rope immediately adjacent to the full tucks. This applies to all types of fiber rope and both eye and short splices. For fiber rope under one inch in diameter, the tail will project at least six inches beyond the last full tuck.
- Fiber rope slings will have a minimum clear length of rope between eye splices equal to ten times the rope diameter.
- Knots will not be used in lieu of splices.
- Clamps not designed specifically for fiber ropes will not be used for splicing.
- For all eye splices, the eye will be large enough to provide an angle of not greater than 60° at the splice when the eye is placed over the load or support.

APPENDIX C: Wire Rope and Wire Rope Slings Inspection Procedure

Appendix D presents a wire rope sling inspection form. The following information is to be used as a guide for inspecting wire rope and wire rope slings. Inspection frequency should be based on safety factors, property damage, and the cost of replacing destroyed or damaged goods and material dropped due to the use or misuse of improper or damaged wire rope and slings. Additionally, slings should be inspected at regular intervals. This interval should be determined by the user and is dependent upon the particular use of the sling and NCDOT safety requirements.

A sling should be inspected after any unusual situation that may have damaged it, such as overload, accident, or fire. It should not be returned in service until continued safe operation has been verified.

Each sling should have a serial number. If no number is available, a tag should be attached at the time of inspection. This number should be listed on the inspection report.

Inspection should be performed only by persons with sufficient experience and knowledge to properly apply the criteria for rejection.

The following should be considered criteria for rejection:

- **Randomly Distributed Broken Wires in One Rope Lay:** There should be no more than 10 broken wires in one lay for the entire length of the sling.
- **Broken Wires in One Strand of One Rope Lay:** There should be no more than five broken wires in any one strand (single wire) of any one rope lay.
- **Abrasion:** There should be no wearing, scrubbing, or preening of any outside wire causing the reduction of the diameter of a single wire by more than 1/3.
- **Kinking and/or Crushing:** There should be no kinking, crushing, or other damage that results in detrimental distortion of the rope structure.
- **Bird Caging:** There should be no opening or unlaying of the rope lays nor should the fiber core of the rope be exposed.
- **Heat Damage:** There should be no evidence of heat damage including bare electrical conductor, grounding, or welding arc.
- **Corrosion:** There should be no evidence of pitting or heavy coating of rust due to corrosion.
- **Reduced Diameter:** There should not be any reduction of the diameter of the rope along the main length or of any section (overloading or contact with sharp edges of load without permission).
- **End Attachments:** There should be no evidence of cracks, deformity, excessive corrosion, or excessive wear of the fittings forming the splice or socket.
- **Hooks and Rings:** Check for throat opening (no more than 15% stretch), twist (no more than 10%), cracks (none), and corrosion.

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APPENDIX D: Wire Rope Sling Inspection Form

SLING SERIAL NUMBER: _____			
Date: _____	Division: _____	Location: _____	
Type: _____	Size: _____	Length: _____	Load Limit: _____

WIRE ROPE	
Randomly distributed broken wires in one rope lay (10)	
Broken wires in one strand of one rope lay (5)	
Wear or scraping of outside individual wires (one-third of original diameter)	
Kinking	
Crushing	
Bird Caging	
Heat Damage	
Corrosion	

END ATTACHMENTS	
Cracked	
Deformed	
Worn	
Corrosion	

SLING HOOKS	
Check throat opening (less than 15%)	
Check twist (less than 10%)	
Check for cracks	

A check mark indicates no fault

An "x" indicates damage

Overall condition: New: _____ Satisfactory: _____ Poor: _____ Remove: _____

Date of Last Inspection: _____

Date of This Inspection: _____

Replacement Date: _____

Signature of Inspector: _____

APPENDIX E: Chain and Chain Sling Inspection Procedure

General Inspection Guidelines

A good chain and chain sling inspection program should provide more than a physical check of the chain's condition. It should be a complete recorded history of each unit.

If conditions and/or time make it impossible to write such a history, the following requirements are minimum essentials in any type of inspection program:

- Positive identification of the chain as to the material from which it is made
- Evaluation of the condition of the chain

In recent years, some manufacturers have identified their chain links with appropriate markings to help you. Some alloy slings will have the letter "A" stamped on the hook(s), or three welded dots on the top coupling link(s). After completion of identification of the chain, a proper procedure for inspection can be conducted in the following manner:

- Clean the chain so that defects may be detected more easily.
- Hang chain in a vertical position for preliminary inspection and to measure length. When this is not possible, stretch chain out on level floor with all twists removed.
- Record the serial number, current measured length, size, type, and grade of material on your work sheet--if no serial number is available, an I.D. tag should be attached that shows the size, grade, reach rate capacity, and sling manufacturer.
- Check for localized stretch or wear. Compare the new measured length with the original I.D. tag. An increase in length may be due to stretch or wear, or to a combination of both. If the new measurement is more than the original, then:
 - Lift each link from its seat and check for grooving
 - Look for:
 - Twisted and bent links
 - Cracks and welded areas (repairs)
 - Corrosion pits
 - Burned links caused by welding "stings," buss bar, or ground contacts
- Check for gouges and nicks.
- Check master links and hooks for the above faults.
- Complete inspection.
- Store chains and chain slings.

The remaining pages of Appendix E provides specific details on the chain and chain sling inspection procedure.

APPENDIX E: Chain and Chain Sling Inspection Procedure (Continued) 2**Check for Localized Stretch or Wear**

It is important that an inspector realize the difference between stretch and wear. A chain with long service and frequent use will increase in length even if not overloaded. This increased length caused by wear should not be confused with stretch. It is also possible to get increased length due to stretch with little or no wear. At times there will be a combination of both conditions.

Remember that increased length due to wear is normal for a chain that has been in service for a long period of time. However, increased length due to stretch, with little or no wear, indicates a serious error in the lifting procedure.

An accurate method to check stretch or percent elongation is to evaluate the following expression:

$$E_p = \frac{(L_m - W_B) - L_i}{L_i} \times 100$$

Where:

E_p = Percent elongation

L_m = Measured inside link length

W_B = Measured bearing point wear for both ends of the link

L_i = Original (when new) inside length

Example:

L_i = 1.55"; 1/2" Alloy (when new) inside length

L_m = 1 11/16" or 1.68" = measured inside link length

W_B = 1/32 x 2 = 1/16 or 0.06" = measured bearing point wear for both ends of the link

$$\text{The Percent elongation} = E_p = \frac{(1.68 - 0.06) - 1.55}{1.55} \times 100 = 4.5 \%$$

Although this method will provide you with the most accurate results, difficulties may be encountered because all manufacturers vary slightly in their link lengths. This method of computation should be followed when the original length is known. Therefore, when establishing your original inspection record cards, link lengths should be recorded after measurement for all new chains placed into service. A similar procedure should be conducted on any chain added after it has been repaired.

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APPENDIX E: Chain and Chain Sling Inspection Procedure (Continued) 3

Normally wear will occur primarily at the bearing points, the inside ends of the links where the adjoining links are seated. Where wear is evident, measure the cross section of the link(s) at each end. Table E-1 presents the maximum allowable wear for chain slings. If the amount of wear equals or exceeds the maximum allowable wear for that chain size, the chain should be removed.

Table E-1: Maximum Allowable Wear for Chain Slings (In Inches)			
Chain Size Inches	Maximum Allowable Wear	Chain Size Inches	Maximum Allowable Wear
1/4	3/64	1	3/16
3/8	5/64	1- 1/8	7/32
1/2	3/32	1- 1/4	1/4
5/8	9/64	1- 3/8	9/32
3/4	5/32	1- 1/2	5/16
7/8	11/64	1- 3/4	11/32

Go/no-go gauges may be used to determine maximum allowable wear, but a set of calipers will enable you to obtain accurate wear figures to record on the sling history chart.

Chains that show signs of stretch or wear can be divided into four categories:

- Stretch throughout the entire length of the chain
- Localized stretch
- Combination of stretch and wear
- Wear only

Stretch Throughout the Entire Length of Chain

This can only be caused by overload. If chain is multi-legged, there is the possibility that extremely low angle lifts caused overloading. If at all possible, the angle between the chain branch and the horizontal should be no less than 30 degrees. Check the rigging handbook for applicable safe load limits for other degree of angles. Chances are that by increasing the size of your sling by one size, you will be able to avoid stretching the sling.

Localized Stretch

This differs from stretch throughout the entire length of chain because the initial load was probably below the weight which would cause permanent deformation. This condition is often caused by either choking a load at low angles or using wrapped slings on sharp corners without proper padding or other means of protection. Chains wrapped around sharp corners can cause stress to be applied to one or very few links rather than the entire length of chain. The angles of lift should be checked with applicable load figures. Efforts should be made to protect chains on sharp corners.

APPENDIX E: Chain and Chain Sling Inspection Procedure (Continued) 4

Combination of Stretch and Wear

Prime attention when considering the worn portion of the chain should be given to the length of time that the sling has been in service. If usage has been over a prolonged period of time, worn portions are probably normal and stretched links should be investigated as stated in previous paragraphs.

Wear Only

This should be investigated on the basis of severity of service, time in service, and size of sling. For very severe wear applications, it is often more economical to change to a sling made from a large diameter material.

Check for Gouges and Nicks

These chains and chain slings should be evaluated as in “Localized Stretch.” There are possibilities that the chains were used on sharp corners and that padding or other means of chain protection would help. The hardness of the chain should also be checked.

Check Master Links

Check for wear and correct style. If a pear-shaped master link is used on a larger crane hook it may not seat properly if inverted. The pear-shaped master link is normally used only with a single chain sling. In most instances an oblong master link is desirable with multi-legged slings.

Completion of Inspection

Review the inspection record sheets. Information should now be available that could help reduce the number of future rejections.

Storage of Chains and Chain Slings

Chains and slings should be hung on racks in the shop. Slings must be stored properly. Short slings should be hung from adequate fixtures so that there is no possibility of kinking or corrosion from contact with the ground. Longer slings should be rolled and tied and also hung to prevent contact with the ground and to eliminate tripping hazards. If at all possible, the slings should be stored indoors. Good storage facilities will demonstrate the importance of chains and slings receiving proper care at all times.

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APPENDIX F: Chain Sling Inspection Form

CHAIN SERIAL NUMBER: _____

Date: _____ Division: _____ Location: _____

Sling Type: _____ Size: _____ Reach : _____ Load Limit: _____

CHAIN

Localized Stretch or Wear	
Grooving	
Twisted or Bent Links	
Cracks	
Gouges	
Corrosion Pits	
Burns	

MASTER LINKS AND HOOKS

Check Master Links and hooks for any of the above faults	
Check Hook Throat Opening (less than 15%)	
Check Hook Twist (less than 10%)	

A check mark indicates no fault

An "x" indicates damage

Overall condition: New: _____ Satisfactory: _____ Poor: _____ Remove: _____

Date of Last Inspection: _____

Date of This Inspection: _____

Replacement Date: _____

Signature of Inspector: _____

APPENDIX G: Slings Removal from Service

Wire Rope Slings

Wire rope slings will be removed from service when the following conditions are present:

- Ten randomly distributed broken wires in one rope lay or five broken wires in one strand in one rope lay
- Wear or scraping on one-third the original diameter of outside individual wires
- Kinking, crushing, bird caging, or any other damage resulting in distortion of the wire rope structure
- Evidence of heat damage
- Hooks opened more than 15% of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook
- Corrosion of the rope or end attachments

Natural and Synthetic Fiber Rope Slings

Natural and synthetic fiber rope slings will be removed from service when any of the following conditions are present:

- Abnormal wear
- Powdered fiber between strands
- Broken or cut fibers
- Variations in the size or roundness of strands
- Discoloration of hardware in the sling

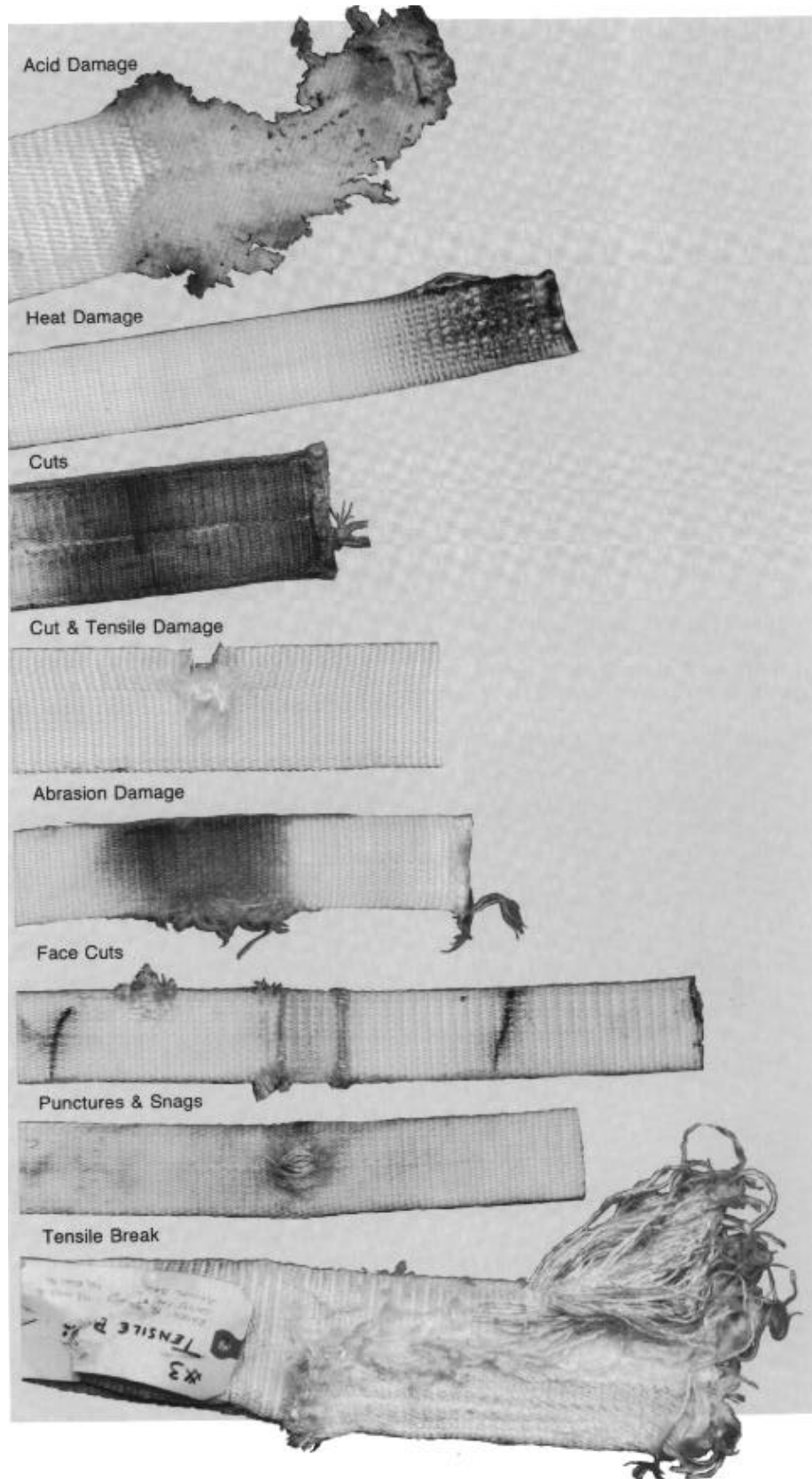
Synthetic Web Slings

Synthetic web slings will be removed from service when any of the following conditions are present and as shown in Figure 3 (next page):

- Acid or caustic burns
- Melting or charring of any part of the sling surface
- Snags, punctures, tears, or cuts
- Broken or worn stitches
- Distortion of fittings

APPENDIX G: Slings Removal from Service (Continued) 2

Figure 3



Emergency Evacuation and Fire Prevention Plans**SPP# 1910.38****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures for developing and implementing emergency evacuation and fire prevention plans.

2.0 Scope and Applicability

Emergencies in the workplace can develop into disasters if they are not addressed in the appropriate manner. Disasters can be man-made (fires, structural collapses, explosions, and chemical releases) or can develop from natural events (floods, tornadoes, hurricanes, earthquakes, and lightning). Therefore, preplanning a facility's response to an emergency and a facility's fire prevention strategy can minimize suffering and losses.

This safety policy and procedure provides guidelines for implementing emergency evacuation and fire prevention plans in the workplace. It includes provisions for training and requirements for the emergency evacuation plans, fire prevention plans, and employee alarm systems.

This document also details the areas of responsibility for managers/unit heads, supervisors, and employees within the North Carolina Department of Transportation (NCDOT).

This safety policy and procedure applies to all NCDOT employees.

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3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.38) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.35).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT facilities must have emergency evacuation and fire prevention plans. When hazards exist that cannot be eliminated, administrative practices, engineering practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Emergency Evacuation and Fire Prevention Plans will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Emergency Evacuation and Fire Prevention Plans in accordance with this safety policy and procedure. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Emergency Evacuation and Fire Prevention Plans.

6.1 Definitions

Designated Employee

Individual assigned to assist the emergency/fire prevention coordinator in evacuations and fire prevention.

Emergency Evacuation/Fire Prevention Plan Coordinator

Individual responsible for administering the emergency and/or fire prevention plans for a NCDOT facility.

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Emergency Evacuation Plan

A plan describing procedures required for employee protection from fire or other emergencies in the workplace.

Exit

That portion of a means of egress from a building, structure, or worksite.

Exit Access

That portion of a means of egress which leads to an entrance to an exit.

Fire Prevention Plan

A plan describing procedures required for employees to prevent fires in the workplace.

Means of Egress

A continuous and unobstructed way of exit travel from any point in a building, structure, or worksite to a public way.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. The elements included in this safety policy and procedure as adopted by NCDOT are:

- Training
- Evacuation Plans
- Fire Prevention Plans
- Employee Alarm Systems
- Written Plan Location

6.2.1 Training

Training will be required for designated employees and emergency/fire prevention plan coordinators. This training will include elements for both the evacuation and fire prevention plans. This training will qualify the emergency/fire prevention coordinator and the designated employees to fulfill any element of the emergency and/or fire prevention plans. This training will consist of:

- Means of reporting fires and other emergencies
- Evacuation procedures
- Familiarization with evacuation routes
- Review of employee accountability procedures
- Identification of workplace fire hazards
- Fire prevention practices

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- Alarm systems
- Proper housekeeping procedures

This training will include initial training and retraining when responsibilities or conditions/surroundings change. In addition, these employees will assemble semi-annually to discuss changes in the current methods or plans. Appendix A presents a form for documenting your training.

6.2.2 Emergency Evacuation Plans

Each NCDOT facility will establish evacuation plans to be used in emergencies. These emergencies will include fires, tornadoes, hurricanes, toxic chemical release, blizzards, floods, or other natural disasters. This plan will include:

- Emergency Plan Coordinator contact information
- Preferred means of reporting fires and emergencies
- Alarm system documentation
- Fire or other safety equipment
- Evacuation routes (paths and locations of exits)
- Emergency escape procedures and assignments
- Procedures to account for all employees after an evacuation

Appendix B contains a guide for an emergency evacuation plan.

6.2.3 Fire Prevention Plan

Each NCDOT facility's fire prevention plan will include:

- Fire Prevention Plan Coordinator contact information
- A list of major workplace fire hazards and their proper handling and storage procedures and fire protection equipment
- Proper housekeeping procedures
- Safety of evacuees once outside the structure or facility
- Appropriate traffic control plans as applicable if parking lots are used as an evacuee gathering point

Appendix C contains a generic guide for a fire prevention plan.

As part of the workplace fire hazard list, potential ignition sources such as welding and smoking will be identified. Additionally, measures required to control those workplace fire hazards and equipment designed to control or extinguish fires will be included as a part of the fire prevention plan.

All buildings or structures will be maintained in such a manner to avoid the creation of potential sources of ignition. Work shops will be cleaned

SAFETY POLICY & PROCEDURE

regularly and accumulations of flammable materials will be removed or stored in approved fire containers.

Buildings that primarily house support individuals will maintain the aisles in a clear and orderly fashion. All waste and combustible materials such as cardboard or trash in trash receptacles will be stored in such a manner to avoid the creation of a fire hazard. Refer to [SPP# 1910.157, Fire Protection](#), for details on fire protection and suppression.

6.2.4 Employee Alarm Systems

An employee alarm system shall be in place for each NCDOT facility to provide warning for necessary emergency action. This alarm system will also provide an adequate reaction time for safe escape of employees from the workplace or immediate area.

These alarm systems shall be maintained and be operable at all times. A checklist in Appendix B is provided for annually checking alarm systems. If an alarm is defective it shall be identified and repaired promptly. Refer to [SPP# 1910.157, Fire Protection](#), for additional details on employee alarm systems as related to fire protection.

6.2.5 Written Plan Location

These emergency and fire prevention plans will be available on-site for updating and internal audit purposes and for review by employees, and regulatory agencies.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funding is available for the purchase of proper equipment, supplies and training for emergency and fire prevention plans. Managers/Unit Heads will appoint individuals to serve as emergency and fire prevention plan coordinators, alternate (backup) emergency and fire prevention plan coordinators, and designated employees.

They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

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6.3.2 Supervisors

Supervisors will be responsible for ensuring that the emergency evacuation and fire plan is posted in a conspicuous location and that employees are trained at the start of employment, upon reassignment, and yearly thereafter.

Supervisors are responsible for ensuring new and existing employees are familiar with building layouts and are instructed in the most efficient evacuation methods.

Supervisors should ensure that electrical equipment is properly grounded, insulated, and maintained and that all flammable or combustible materials are properly stored, ventilated, and contained.

Supervisors are also responsible to ensure that all fire extinguishers and other related equipment are in good working condition. If any indication of damaged or outdated equipment is present, the equipment will be removed from service and repaired/replaced. (Fire extinguishers must be replaced if sent out for service.)

6.3.3 Emergency /Fire Prevention Plan Coordinator

The Emergency/Fire Prevention Coordinator will serve as the primary contact and the administrator of the emergency evacuation and fire prevention plans. The requirements of the emergency evacuation and fire prevention plans can be coordinated by one individual or by two individuals as determined by the managers/unit heads.

The coordinator will keep the emergency evacuation and fire prevention plans and the elements of those plans current. A backup (alternate) coordinator will also be identified and be capable of administering the requirements of these plans.

6.3.4 Employees

It is the responsibility of each employee to ensure they are familiar with the emergency evacuation and fire prevention plans. Each employee should also be familiar with posted exits and evacuation routes. Employees will report suspected hazards to their supervisor immediately.

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety Engineers will provide consultative and audit assistance on emergency evacuation and fire prevention plans. Additionally, Safety and Loss Control will assist in developing of or in the securing of required training.

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APPENDIX A: Emergency Evacuation and Fire Prevention Plan Training

Date: _____ **Location:** _____

Instructor: _____ **Title:** _____

Emergency Evacuation Plan Elements to be Reviewed

- ☐ Emergency Escape Procedures
- ☐ Escape Route Assignments
- ☐ Special Procedures for Personnel to Operate Critical Equipment
- ☐ Procedures to Account for Employees
- ☐ Special Rescue and Medical Personnel
- ☐ Employee Training Programs

Fire Prevention Plan Elements to be Reviewed

- ☐ Major Workplace Fire Hazards
- ☐ Fire Prevention Practices
- ☐ Fire Equipment Maintenance Personnel
- ☐ Means of Reporting Fires and other Emergencies
- ☐ Alarm Systems
- ☐ Personnel Responsible for Control of Fuel Source Hazards
- ☐ Proper Maintenance Procedures
- ☐ Proper Housekeeping

Other Elements to be Reviewed

- ☐ Names and Titles of Emergency and Fire Prevention Plan Coordinators
- ☐ Emergency and Fire Prevention Plan Availability

Employees Trained

Name/SS#	Work Location/Unit	Job Title	Signature
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Instructor's Signature: _____

SAFETY POLICY & PROCEDURE

APPENDIX B: Emergency Evacuation Plan

Evacuation Plan Elements

Name of NCDOT Unit: _____

Address: _____

Telephone Number: _____

Emergency Evacuation Plan Coordinator

(Name) (Title)

(Division/Unit) (Telephone Number)

The Coordinator may be contacted for further information/explanation regarding the plan.

Preferred Means of Reporting Fire and Emergencies

All fires and emergencies will be reported by the following means: _____

Alarm Systems

Alarm systems for notifying all employees in an emergency are of the following type: _____

When alarm systems are required they should meet the requirements as listed in the following checklist.

Meets the Requirements

Requirements

Yes No

☐ ☐

Provides warning for safe escape

☐ ☐

Can be perceived by all employees

☐ ☐

Alarm is distinctive and recognizable

☐ ☐

Employees are properly trained

☐ ☐

Emergency telephone numbers posted

☐ ☐

Emergency alarms have priority

☐ ☐

Alarm procedures are established

☐ ☐

All alarm components are approved

SAFETY POLICY & PROCEDURE

APPENDIX B: Emergency Evacuation Plan (Continued) 2

Alarm Systems (continued)

Meets the Requirements

Requirements

Yes No

☐☐

Alarms restored promptly after test

☐☐

Spare alarm devices are available

☐☐

Alarm system is maintained properly

☐☐

Effective alarm tests conducted every two months

☐☐

Power supplies are maintained and backups are provided

☐☐

Supervised systems provide positive notification of any defect and are tested annually

☐☐

Alarms are maintained properly by trained personnel

☐☐

Manually operated devices are not obstructed and are readily accessible

Emergency Escape Procedures and Routes

Emergency escape procedures and route assignments should be posted in each work area. The “Emergency Escape Procedures and Escape Route Assignment” sheet follows. All employees must have been trained by supervision in the correct procedures to follow during a fire or other emergency.

SAFETY POLICY & PROCEDURE

APPENDIX B: Emergency Evacuation Plan (continued) 3

IN CASE OF FIRE OR OTHER EVENT REQUIRING EVACUATION, FOLLOW THE EVACUATION ROUTES AS DESIGNATED BELOW. CAREFULLY STUDY AND USE THE EVACUATION ROUTES AND POST EVACUATION RALLY POINTS (*) (**). IF YOU HAVE QUESTIONS, SEE YOUR SUPERVISOR.

Sketch indicating the facility layout, emergency evacuation routes, and post evacuation rally points.

ACCOUNTABILITY

Persons evacuating the facility will be required to meet at a predetermined location in order to account for all persons.

Primary post evaluation rally point (*)_____

In the event that the primary rally point (*) is hazardous due to wind direction or other uncontrolled conditions, an alternate rally point (**) has been assigned.

Alternate rally point (**)_____

SAFETY POLICY & PROCEDURE

APPENDIX B: Emergency Evacuation Plan (continued) 4

Training

The personnel listed below have been trained to assist in the safe and orderly emergency evacuation of employees. Employee training is provided to employees when:

- The plan is initiated
- An employee's required actions and responsibilities change
- There are any changes to the plan

Name	Title	Work Area	Special Assignment
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Employee Accountability Procedures After Evacuation

After the evacuation, each supervisor (or designee) is responsible for accounting for each employee assigned to the supervisor, by rallying at a predetermined point and by conducting a head count. Each assigned employee will be accounted for by name. All supervisors are required to report their head count (by name) to the Emergency Plan Coordinator.

Each supervisor is responsible for accounting for each of his or her assigned employees following an evacuation. This will be accompanied by these procedures:

- Rally points are to be established for all evacuation routes and procedures. These points are designated by an asterisk (*) on each posted work area escape route.
- All work area supervisors and employees must report to their primary rally points immediately following an evacuation.
- Each employee is responsible for reporting to his or her supervisor. Supervisors will account for all employees and report the information to the Emergency Plan Coordinator.
- The Emergency Plan Coordinator will be located at one of the following locations:

Primary Rally Point Location: _____

Alternate Rally Point Location: _____

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APPENDIX C: Fire Prevention Plan

Fire Prevention Plan Elements

Name of NCDOT Unit: _____

Address: _____

Telephone Number: _____

Fire Prevention Plan Coordinator

_____ (Name)	_____ (Title)
_____ (Division/Unit)	_____ (Telephone Number)
_____ (Home Address)	_____ (Home Phone Number)

Person Responsible for Maintenance of Fire Equipment and Systems

_____ (Name)	_____ (Title)
_____ (Division/Unit)	_____ (Telephone Number)
_____ (Home Address)	_____ (Home Phone Number)

Person Responsible for Control of Fuel Source Hazards

_____ (Name)	_____ (Title)
_____ (Division/Unit)	_____ (Telephone Number)
_____ (Home Address)	_____ (Home Phone Number)

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APPENDIX C: Fire Prevention Plan (continued) 2

List of Major Fire Hazards

Flammables	Location	Handling Procedure	Storage Procedure

Processes	Location	Precautionary Steps	Storage Procedure

Combustibles	Location	Handling Procedure	Storage Procedure

Reactives	Location	Handling Procedure	Storage Procedure

SAFETY POLICY & PROCEDURE

APPENDIX C: Fire Prevention Plan (continued) 3

Ignition Sources and Control Procedures

[illegible]

APPENDIX C: Fire Prevention Plan (continued) 4

Waste and Residue Control Procedures

Briefly describe procedures to control wastes or residues which might cause or contribute to a fire. Typical waste/residues could include oily rags, spilled grease, oil, fuels, asphalt, old tires, tubes, used lumber, timbers, wood and paper waste, ashes, used cleaning supplies or solvents, office machine fluid containers, etc.

[illegible]

First Aid

SPP# 1910.151

Quick Reference

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5.0 General Responsibilities	2
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6.3.1 Managers/Unit Heads	5
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6.3.3 First Aid Trained Employees	5
6.3.4 Employees	5
6.3.5 Safety and Loss Control	5
6.3.6 Central Equipment Unit	5

1.0 Purpose

The purpose of this safety policy and procedure is to establish first aid requirements for all North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Prompt medical attention in case of injury on the job is critical to ensure the health and well being of NCDOT employees. Having provisions for timely access to first aid helps to minimize medical costs for NCDOT and fosters a caring attitude among the NCDOT organization.

This safety policy and procedure provides guidelines to determine what first aid requirements are applicable for the various operations in NCDOT. It includes provisions for training, discussion on posting requirements, first aid locations, and first aid room requirements.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, first aid trained employees, employees, and Safety and Loss Control within NCDOT.

This document affects all NCDOT employees.

SAFETY POLICY & PROCEDURE

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.151) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.50).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Because hazards may exist, NCDOT will train adequate numbers of employees in First Aid and provide first aid equipment to ensure that employees receive prompt assistance in case of injury.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on First Aid. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on First Aid.

6.1 Definitions

First Aid

The immediate, temporary care given to the injured or suddenly ill until proper medical attention can be given.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Posting Requirements
- First Aid Access for Buildings
- First Aid Access for Field Personnel
- First Aid Kits

POLICY & PROCEDURES

6.2.1 Training

The employees designated to be trained in first aid will be trained upon their initial designation. This training must certify those in the American Red Cross First Aid and/or an equivalent first aid training. Red Cross-approved refresher training must be done every three years to retain their first aid certification.

For units and work crews in near proximity to medical providers, two individuals per unit and/or work crew shall be trained in first aid. For field units and construction sites which are not in close proximity to medical care and/or are outside metropolitan areas, a *minimum* of two individuals per field unit (or construction site) shall be trained in first aid.

First aid course instructors shall receive training to qualify and authorize them to teach the first aid course. First aid instructors must teach one standard first aid course every three years to retain their teaching qualification.

6.2.2 Posting Requirements

Information will be posted throughout buildings and on jobsites advising employees where the first aid station is located. In addition, all emergency phone numbers will be posted at each telephone for quick reference. The local emergency numbers for local police, fire department, and ambulance service shall always be listed (even in areas with a 911 emergency system).

6.2.3 First Aid Access for Buildings

Buildings housing 150 or more employees will have a first aid room. This room will consist of the following:

- A folded stretcher and blanket
- A telephone and posted instructions for calling a physician and notifying the hospital the patient is in route
- Posted method of transporting ill or injured employees and instructions for calling an ambulance
- A log of all first aid cases and the treatment, medication, or procedure for each employee treated
- A covered trash receptacle operated by a foot pedal
- Dispensers for soap, towels, cleaning towels, and disposable cups
- A bed
- A supply of clean blankets
- A supply of clean sheets and pillow cases
- Emergency oxygen equipment
- First aid manual
- Lavatory with hot and cold water

Additionally, there will be a wall-mounted first aid station on all floors with the exception of the floor on which there is a first aid room.

SAFETY POLICY & PROCEDURE

In buildings with less than 150 employees, the following is required to ensure that employees have access to medical supplies and services:

- Emergency telephone numbers posted by each telephone
- Signs directing employees to the location of the first aid kit
- A 24-unit wall-mounted first aid kit
- First aid manual

6.2.4 First Aid Access for Field Personnel

All field employees will have access to first aid supplies. This will be achieved by ensuring each location/operation is equipped with a 24-unit first aid kit. This kit will be adequate to service the number of employees normally found on a job site.

In addition to first aid supplies, NCDOT will ensure that an adequate number of field employees are trained in first aid/CPR or both. This number should be determined by size of divisions, vacations, sick leave, etc.

6.2.5 First Aid Kits

The 24 unit first aid kit will consist of the following items:

- 2-4x4 Bandage Compress
- 3x3 Gauze Pads (4 per box)
- 2-Triangular Bandages (44" Tyvek)
- 4 inches x 5 yards Gauze Bandage
- 1/2 inch x 2.5 yards Adhesive Tape (2 per box)
- Sting Kill Swabs (10 per box)
- 2 boxes of 1 inch Adhesive Bandages (16 per box)
- Sterile Buffered Isotonic Eyewash Kit (1 oz) with 2 eye pads, 2 adhesive strips
- Instant Cold Pack
- Triple Antibiotic Ointment (1/32 oz pks 10 per box)
- CPR Micro shield Rescue Breather with gloves
- Disposable gloves (2 per box)
- Rescue Blanket, silver/silver (space type)
- Burn Spray (2 cans per box)
- Alcohol Wipes (10 per box)
- Ammonia Inhalants (10 per box)
- Scissors

SAFETY POLICY & PROCEDURE

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of first aid equipment and related supplies. They will designate which employees receive first aid training. They will also obtain and coordinate the required training for the affected employees.

6.3.2 Supervisors

Supervisors will assist managers/unit heads as needed. Additionally, they will assist first aid-trained employees as needed.

6.3.3 First Aid Trained Employees

First aid trained employees will administer first aid as conditions and circumstances dictate. They will also be responsible for ensuring that first aid supplies are replenished when used. Additionally, as applicable, they will be responsible for maintaining a clean and orderly first aid room.

6.3.4 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.6 Central Equipment Unit

The Central Equipment Unit will be responsible for maintaining an inventory of first aid supplies.

Illumination

SPP# 1926.56

Quick Reference

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for illumination for North Carolina Department of Transportation (NCDOT) facilities and activities.

2.0 Scope and Applicability

Lighting or lack of lighting can contribute to accidents and to visual strain. Employees and the general public need to see what they are doing and where they are going.

This safety policy and procedure provides guidelines to assist NCDOT management in ensuring that proper and adequate lighting exists in NCDOT facilities and on jobsites. It includes provisions for training, discussion on lighting hazards, recommended illumination levels, night-time construction illumination requirements, and illumination measurement equipment.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT. This safety policy and procedure affects all NCDOT facilities and jobsites.

3.0 Reference

This safety policy and procedure is established in accordance with the Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.56).

SAFETY POLICY & PROCEDURE

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all NCDOT facilities and construction sites will be properly and adequately lighted to minimize accidents. Where poor lighting exists or there is inadequate lighting for the job tasks, NCDOT will provide sufficient lighting for the task. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Illumination. It is also the responsibility of each NCDOT employee to report immediately any unsafe conditions to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Illumination.

6.1 Definitions

Illumination

Light falling on a surface measured in foot candles.

Luminance

Light emitted or reflected from a surface unit area measured in foot/lambert.

Reflectance

Portion of arriving light on a surface that is reflected, measured in percent.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Hazards
- Recommended Illumination Levels for NCDOT Facilities
- Illumination for Night-Time Construction
- Illumination Measurement

SAFETY POLICY & PROCEDURE

6.2.1 Training

Employees will be trained to recognize improper and inadequate lighting in their workplaces. Employees will be trained at the time of their initial employment or assignment.

6.2.2 Light Sources

Light sources are daylight and artificial light. The types of artificial light in NCDOT include:

- Incandescent
- Fluorescent
- High intensity discharge (mercury and sodium vapor)

Each type of artificial light provides a different spectrum of wavelengths and are used in NCDOT based on lighting needs.

Lighting is also classified as general or supplemental. General lighting provides lighting to a large area. A form of supplementary lighting is task lighting. Task lighting provides additional targeted lighting for a particular task or activity.

6.2.3 Hazards

The major hazards associated with lighting include:

- Illumination levels
- Changes in illumination levels
- Glare
- Luminous contrast

Illumination levels can either be too little or too much light. If there is too little light, employees or the public cannot see well. This could result in an error occurring because a dangerous situation may not be recognized with a corresponding decrease in an individual's reaction time.

Extremely bright light can injure receptor cells in the eye. Also, extremely bright light can cause afterimages that can obscure an individual's visual field until their receptor cells can recover. (The afterimage from a camera flashbulb or similar bright light is a common example.) Until an individual can recover from a bright light, the bright light may interfere with one's ability to detect an object.

Changes in illumination levels interfere with the ability of the eye to adjust quickly enough to permit seeing without error. Examples of changing light levels are the transition from bright outdoor light to dark interiors or from a bright area of a building to a dark one. Another example is looking at a brightly lighted task, then moving the eye to a location that is darker.

Glare is the presence of a bright light in the visual field. Direct glare occurs when the light in the visual field is a source light. An example of direct glare is the headlights of an oncoming car at night. Reflected glare occurs when a bright light reflects from a surface. Glare can lead to errors in perception and detection that result in accidents and may produce afterimages or delay visibility due to adaptation.

Luminous contrast refers to the changing light levels of an environment. For example, one may look at work on a desk that has a certain illumination. Shifting the eyes to a wall presents a much darker or lighter level of illumination. When there is too much difference between the two surfaces, the eyes have difficulty adapting, which may lead to visual errors.

6.2.4 Recommended Illumination Levels

Appendix A presents minimum illumination intensities for construction areas, ramps, runways, corridors, offices, shops, and storage areas.

The values in Appendix A should be used as minimum guidelines. Actual environmental conditions and lighting needs may dictate higher illumination levels. However, higher illumination levels have to be balanced against the hazards of that lighting level (See section 6.2.2).

6.2.5 Illumination for Night-Time Construction

Specifications for night-time construction lighting are found in Section 1412 of NCDOT *Standard Specifications for Roads and Structures*. Night-time construction lights consist of tower lights and machine lights.

Tower lights consist of mercury vapor, metal halide, high pressure sodium or low pressure sodium fixtures mounted on a tower approximately 30 feet in height. The lights should be aimed and positioned to illuminate the area for construction work with no disabling glare to the motorist.

Machine lights are mercury vapor, metal halide, high pressure sodium, or low pressure sodium. They are typically conventional roadway enclosed fixtures mounted on supports attached to the construction machine at a height of approximately 13 feet above ground. Machine lights are installed in addition to conventional automotive type head lights.

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Night-time construction lighting must meet all the specifications, provide adequate lighting for the construction work being performed, and sufficiently identify the work zone to motorists. Night-time illumination must be approved by the Resident Engineer.

6.2.6 Illumination Measurement

Illumination is measured in foot-candles. The illumination meter is a convenient piece of equipment that measures illumination of any specified location. This instrument is useful in quantifying your facility's lighting area deficiencies.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted to ensure that adequate illumination levels are maintained in their facilities and jobsites. Managers/Unit Heads will obtain and coordinate the required training for employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will identify areas with inadequate or improper illumination through their facility and jobsite audits. They will also communicate these illumination deficiencies to managers/unit heads.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure. Additionally, they shall report any unsafe illumination conditions to their supervisor.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety and Loss Control will provide technical guidance on illumination problems in the workplace. (NCDOT Design Services will provide technical guidance on night-time illumination problems.)

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Safety Engineers and the Industrial Hygienist will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

SAFETY POLICY & PROCEDURE

APPENDIX A: Minimum Illumination Intensities

Area of Operation or Task	Foot-Candles
General construction area lighting	10
General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance areas	3
Indoors: warehouses, corridors, hallways, and exit ways	20
Tunnels, shafts, and general underground work areas: (Exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Bureau Mines approved cap lights shall be acceptable for use in the tunnel heading)	5
General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active store rooms, barracks or living quarters, locker or dressing rooms, mess halls, and indoor toilets and workrooms)	30
First Aid stations, infirmaries, and offices	100
Working with very small sized objects	200
Working with very small sized objects over a prolonged period	200 - 500
Performance of very prolonged and exacting tasks	500 - 1000

Ionizing Radiation

SPP# 1910.96

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for radiation protection and safety of North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Radiation is a form of energy. Ionizing radiation has very damaging effects on skin tissue and can serve as a precursor to several forms of cancer. Materials and Tests Unit's Nuclear Density gauges are the primary radiation source in NCDOT.

This safety policy and procedure provides guidelines for the safe handling of Ionizing Radiation. It includes provisions for training, description of ionizing equipment used in NCDOT, and the necessity of warning signs for restricted areas. Additionally, it includes discussion on the monitoring of personnel for ionizing radiation exposure and the reporting of ionizing radiation overexposure.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Materials and Tests Unit within NCDOT.

SAFETY POLICY & PROCEDURE

This safety policy and procedure affects any employee who as a result of his or her job duties will handle and operate equipment producing or containing ionizing radiation sources. Specifically, this safety policy and procedure affects Materials and Tests Unit employees who use, calibrate, maintain, and transport nuclear density gauges and field construction employees assigned to projects as nuclear gauge operators.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.96) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.200).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, unauthorized handling of radiation sources is strictly prohibited. When radiation hazards exist that cannot be eliminated, then engineering practices, administrative practices, Personal Protective Equipment (PPE), safe work practices, and proper training regarding Ionizing Radiation will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's policy on Ionizing Radiation. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's policy on Ionizing Radiation.

6.1 Definitions

Dose

The quantity of ionizing radiation absorbed, per unit of mass, by the body or by any portion of the body.

POLICY & PROCEDURES

Film Badge

A piece of masked photographic film worn like a badge for personal monitoring of whole body radiation exposure. Radiation exposure can be checked by developing and interpreting the film.

Ionizing Radiation

Electromagnetic or particulate radiation capable of producing ions, directly or indirectly, by interaction with matter.

Nuclear Density Gauges

A piece of equipment with a radioactive source used for density measurements of asphalt, aggregate base course and concrete.

Radiation

Includes alpha, beta, gamma, x-rays, neutrons, electrons, protons, and other atomic particles. This term does not include sound or radio waves, or visible light, or infrared or ultraviolet light.

Radioactive Material

Any material which emits, by spontaneous nuclear disintegration, corpuscular or electromagnetic emanations.

Restricted Area

Any area to which access is controlled by NCDOT for purposes of protection of individuals from exposure to radiation or radioactive materials.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Equipment
- Warning Signs
- Personnel Monitoring
- Recordkeeping
- Exposure Reporting Procedure
- Emergency Procedures

6.2.1 Training

Materials and Tests Unit shall train employees affected by this safety policy and procedure. The Materials and Tests Unit shall certify as nuclear gauge operators those affected employees and will train other employees who handle nuclear gauge equipment.

SAFETY POLICY & PROCEDURE

The Radiation Protection Branch shall conduct comprehensive training designed to prepare the employee for working safely with and around radiation equipment.

6.2.2 Equipment

The Troxler Nuclear Gauge is the primary piece of ionizing equipment used within NCDOT. Figure 1 presents a sketch of the nuclear gauge. Troxler Nuclear Gauges are used to determine the density of asphalt and aggregate base course. The radioactive material used to perform these tests is in pellet-form, encapsulated inside the equipment.

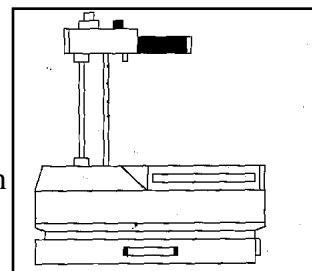


Figure 1

The Troxler Nuclear Gauge must be leak tested every 6 months in accordance with a licensing agreement with the North Carolina Radiation Protection Branch.

6.2.3 Warning Signs

Any facility storing the Troxler Nuclear Gauges shall have signs outside the restricted area notifying employees of the potential dangers. These signs shall contain the standard radiation symbol with the conventional radiation caution colors (magenta or purple on yellow background). Figure 2 shows a typical radiation protection sign. Also, see [SPP# 1910.145, Accident Prevention Signs and Tags](#).



Figure 2

6.2.4 Personnel Monitoring

All employees who use the Troxler Nuclear Gauge will wear film badges at all times to monitor the amount of radiation to which they are exposed. Figure 3 illustrates an exploded view of a film badge. These badges are part of a continuous monitoring program and are replaced monthly.

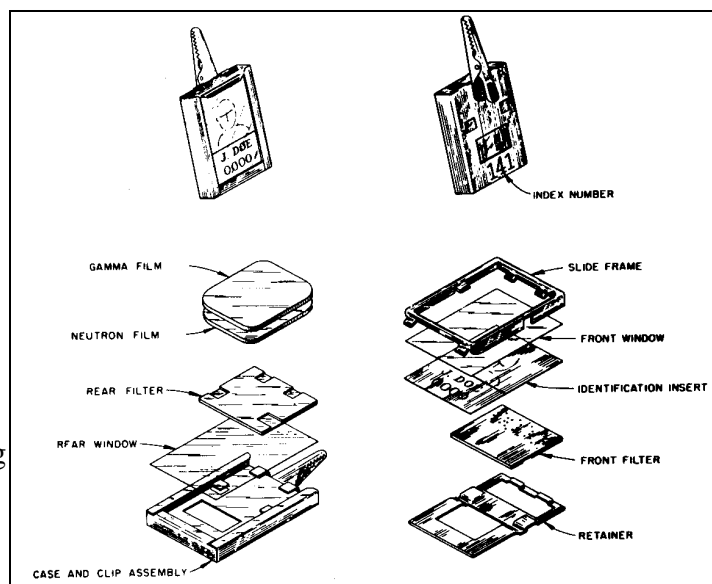


Figure 3

SAFETY POLICY & PROCEDURE

6.2.5 Recordkeeping

NCDOT shall maintain records of exposures for employees who are required to wear film badges. Materials and Tests Unit shall disclose exposures to employees upon request from the employee. These records of exposures shall be maintained for a period not less than 30 years from the termination of employment with NCDOT.

6.2.6 Exposure Reporting Procedure

For employees not protected by the Atomic Energy Commission, all exposures over the allowable threshold limits shall be reported to the NC Commissioner of Labor or his or her duly authorized representative. In addition, exposure notification in writing shall be submitted to the NC Commissioner of Labor or his or her duly authorized representative within 30 days of the original exposure date.

A record of all radiation exposures must be made available to future employers at the request of former NCDOT employees.

6.2.7 Emergency Procedures

Written emergency procedures for nuclear equipment accidents are maintained by Materials and Tests Unit as required by license issued by North Carolina Radiation Protection Branch.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that affected employees are trained in the safe use and handling of equipment, instruments or sources which contain ionizing radioactive materials.

6.3.3 Employees

Employees shall not operate any equipment without the proper training. Employees shall not operate any equipment or instrument which is damaged or in any other way malfunctioning.

SAFETY POLICY & PROCEDURE

Employees will immediately inform their supervisor if any unsafe condition occurs (e.g., leaks, damage, theft or misplacement).

Additionally, employees shall not remove or otherwise modify any part of any instrument except to perform allowed routine maintenance or service.

Employees shall wear film badges as prescribed.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Materials and Tests Unit

Materials and Tests Unit will prepare and calibrate the equipment containing radioactive materials. Additionally, Materials and Tests Unit will provide guidelines for the safe transport of nuclear gauges or other related equipment containing radioactive materials. Materials and Tests Unit will coordinate all training with the North Carolina Radiation Protection Branch for the affected employees.

Materials and Test's Radiation Safety Officer will be responsible for maintaining and updating the radiation license from the Radiation Protection Branch.

Non-Ionizing Radiation

SPP# 1910.97

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for non-ionizing radiation protection and safety of North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Radiation is a form of energy. Non-ionizing radiation has various effects on parts of the human body and can penetrate into the human skin. Certain pieces of equipment in NCDOT have the potential to expose employees to non-ionizing radiation.

This safety policy and procedure provides guidelines for the safe use of equipment and devices that are sources of non-ionizing radiation. It includes provisions for training, brief discussion of general hazards of non-ionizing radiation, and a listing of some of the common non-ionizing radiation equipment and devices used in NCDOT. Additionally, it presents the requirements for non-ionizing radiation recordkeeping.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects NCDOT employees in DMV Enforcement, Traffic Engineering, Highway Maintenance, Construction, Ferry, Aviation, and employees in any other operation who as a result of their job duties are exposed to non-ionizing radiation.

SAFETY POLICY & PROCEDURE

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.97) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.200).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, non-ionizing radiation sources in NCDOT will be managed to minimize non-ionizing radiation exposure to employees. When non-ionizing radiation hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Non-Ionizing Radiation will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Non-Ionizing Radiation. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined under Section 6.3.

6.0 Procedure

This section provides definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Non-Ionizing Radiation.

6.1 Definitions

Electromagnetic Radiation

The portion of spectrum commonly defined as the radio frequency (RF) region, which includes high frequency (HF), very high frequency (VHF), ultra-high frequency (UHF), and the microwave frequency regions.

Non-Ionizing Radiation

Electromagnetic radiation in the radio frequency (RF) region between 30 MHz and 30 GHz. This radiation has sufficient energy to cause excitation of electrons, atoms, or molecules, but insufficient energy to cause the formation of ions.

POLICY & PROCEDURES

Partial Body Irradiation

Exposure of a body part to the incident electromagnetic energy.

Radiation Protection Guide

Provides guidelines for radiation exposures. These radiation exposures can be continuous or intermittent and can pertain to either whole body or partial body irradiation.

Whole Body Irradiation

Exposure of the entire body to the incident electromagnetic energy.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- General Hazards
- Equipment Used in NCDOT
- Training Requirements
- Recordkeeping

6.2.1 Training

Employees who may be assigned to duties where they may be exposed to hazardous levels of non-ionizing radiation shall be instructed in the recognition and avoidance of hazards associated with non-ionizing radiation.

Special training is required for operators, users, installers, and repairmen of speed detection devices and other types of radar equipment such as weather or navigational radar. Those employees must be properly trained in the procedures for the safe performance of their assigned duties.

6.2.2 General Hazards

Employee radiation levels should not exceed those levels specified in the Radiation Protection Guide. The greater hazards are associated with the higher frequencies. It has been shown that some parts of the human body (e.g., brain, eyes, testicles) may be harmed by exposure to significantly excessive levels of non-ionizing radio frequency (RF) radiation.

6.2.3 Equipment Used in NCDOT

Some common equipment and devices used in NCDOT with varying levels of non-ionizing radiation include:

SAFETY POLICY & PROCEDURE

- Hand held radios (Walkie Talkies), cellular and portable phones
- Mobile radios
- Base stations
- Radar guns
- Navigational systems and weather radar

Appendix A presents detailed safety information on these equipment and devices.

6.2.4. Recordkeeping

NCDOT will maintain a record of employee exposures for employees that are required to wear personal monitoring equipment. Exposures will be disclosed to employees on an annual basis by his or her supervisor.

These records will be maintained for a period of not less than 30 years.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that the necessary radio frequency energy emitting equipment and supplies are budgeted for and acquired. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

Managers/Unit Heads will ensure that supervisors are capable of recognizing and taking steps to avoid the exposure of any employee to non-ionizing radiation hazards.

6.3.2 Supervisors

Supervisors will ensure that all operators, users, installers, and repairmen of speed detection devices and other types of radar equipment, such as weather or navigational radar, have received the required training prior to performing any duties.

Supervisors will ensure that energy emitting equipment and test instruments are maintained in good repair for their intended use. Supervisors shall be thoroughly familiar with methods of recognizing and avoiding non-ionizing radiation hazards.

SAFETY POLICY & PROCEDURE

6.3.3 Employees

It is the responsibility of each employee to identify potential hazards when required to work with or near sources of non-ionizing radiation. It is also the responsibility of each employee to refrain from work involving exposure to potentially hazardous radiation levels without instruction/training specific to the hazards of the tasks involved. Additionally, close guidance by a responsible party trained in the recognition and avoidance of non-ionizing radiation hazards is also required for employees.

Employees will report suspected hazards to their immediate supervisor and are required to follow instructions by the trained responsible party in all matters of work with or near non-ionizing radiation sources.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure. The consultative and audit assistance may consist of surveys of RF emitting equipment and procedures.

APPENDIX A: Important Safety Information

General Information

- Fixed (base) and mobile radio (including aircraft and water vessel radios) station components, transmission lines, and antennas should be installed and maintained so as to confine RF radiation to antenna radiating elements themselves.
- All covers should be tightly installed and kept in place.
- Good grounding and tightly fitting transmission line (coaxial cable) connectors are essential in preventing potentially harmful levels of radiation leakage from transmission lines and other components of the system.
- Loose or damaged covers, loose cable or wiring connections, or crushed or damaged transmission line should be repaired immediately to prevent hazardous exposure.

Hand Held Radios (Walkie Talkies), Cellular and Portable Telephones

- Be sure to maintain an inch or more between your head and any part of the antenna when using these devices when power levels are greater than 2 or 3 watts.
- Always keep the tip of the antenna away from your head regardless of power level.
- Use remote antennas (roof, trunk, window mount, etc.) when and where possible.
- Never use hand held radios or telephones with damaged cases, damaged antennas, loose or missing components.

Mobile Radios

- Remain seated in the vehicle or maintain a safe distance (5 feet or more) from the antenna when transmitting.
- Never transmit if someone is in close proximity to or is touching the antenna.

Base Stations and Similar Moderate to High Power Installations (i.e., Ferry)

- Stay away from base station antennas and supporting structures.
- Never transmit if someone is near the antenna or working on the supporting structure.
- Personnel should never be within 15 feet of the station antenna or on the supporting structure when the radio is transmitting.

Fixed and Hand Held Speed Detection Devices (Radar Guns)

- Follow the manufacturer's instructions for the safe use of these devices.
- Do not look into or point the antenna end of a radar gun toward people or animals.
- Avoid placing yourself in the path of a radar beam.
- Always turn off the power to a radar gun when not in use.
- Devices not in use should be stored in the manner prescribed by the manufacturer, never placed on your lap, between your legs, or otherwise in contact with or in close proximity to any part of your body.

APPENDIX A: Important Safety Information (Continued) 2

- All NCDOT employees that supervise the work of employees using hand held or stationary radar guns will inform those employees of the hazards associated with prolonged exposure to operation.

Speed Detection Device (Radar Gun) Maintenance

- All hand held or stationary radar guns will be maintained at 100% performance of operation.
- Devices suspected of malfunctioning in any fashion or with visible damage shall be immediately taken out of service and tagged as unserviceable.
- Supervisors are responsible for obtaining repair services, whenever required, and for scheduling annual service to ensure proper operation.

Special Training Required for Speed Detection Equipment Use

- Supervisors will ensure each employee whose job duties require the use of speed detection devices will be properly trained in the safe use, care, and storage of equipment.

Navigational Systems and Weather Radar

- Stay away from antennas. Never attempt to work on antennas during transmission.
- Use and maintain these systems according to the manufacturer's instructions.
- Follow all the requirements of the sections on high power stations and all radar safety information above.

Recordkeeping and Disclosure

- NCDOT will maintain a record of employee exposures for employees that are required to wear personal monitoring equipment.
- Exposures will be disclosed to employees on an annual basis by his or her supervisor.
- These records will be maintained for a period of not less than 30 years.

Hearing Conservation Program

SPP# 1910.95

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1.0 Purpose

This safety policy and procedure establishes the methods and accountability for implementing the North Carolina Department of Transportation (NCDOT) Hearing Conservation Program to prevent hearing impairment of NCDOT employees in accordance with OSHA regulations.

2.0 Scope and Applicability

This safety policy and procedure provides guidelines for implementing the NCDOT Hearing Conservation Program. The program includes the identification and control of noise within work areas through engineering means and administrative control of employee noise exposure along with the selection and use of hearing protectors. It also details the areas of responsibility for managers/unit heads, supervisors and employees within NCDOT. Additionally, this safety policy and procedure sets forth requirements for noise exposure surveys, audiometric testing, recordkeeping, employee training in the use of hearing protection, and an evaluation of program effectiveness.

SAFETY POLICY & PROCEDURE

Specific applicability for employee enrollment in the program will be determined based on noise exposure levels. Employees with noise exposures that equal or exceed an 8-hour Time Weighted Average (TWA) sound level of 85 dBA, as determined by NCDOT Safety and Loss Control, will participate.

Until additional monitoring data identifies other affected positions, these employees are to be included in the Hearing Conservation Program:

- Motor Grader Operators
- Mower Operators
- Pan Operators
- Crawler Drill Operators
- Roller Operators
- Shipyard Welders, Chippers, and Powerhouse Attendants
- Ferry Engineers, Chief Engineers, and Deckhands
- Geotechnical Technicians I and II
- Road Oil Belt Operators on the chip spreaders
- Road Widener Operators
- Dozer Operators
- Paver Operators and Paver Screedmen
- Athey Loader Operators
- Track and Back Hoe Operators

3.0 References

This safety policy and procedure is established in accordance with OSHA standards 29 CFR 1910.95 and 29 CFR 1926 parts .21, .52 and .101.

4.0 Policy

It is the policy of the NCDOT to provide a safe working environment without exposure to excessive noise levels. NCDOT will take measures to reduce workplace noise to acceptable levels. Where such measures fail to reduce sound levels adequately, employees will be provided hearing protection and enrolled in the Hearing Conservation Program at no cost to the employee.

NCDOT will provide assistance, either through the acquisition of equipment or through reassignment to an equivalent job, to any employee who is found to have a noise induced hearing loss as a result of his or her job duties to such a degree that it affects job performance.

5.0 General Responsibilities

It is the responsibility of each individual within NCDOT who supervises the work of others to ensure implementation of NCDOT's Hearing Conservation Program.

SAFETY POLICY & PROCEDURE

It is the responsibility of each employee included in NCDOT's Hearing Conservation Program to comply with all elements of the plan that are specifically applicable to employees.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's Hearing Conservation Program. (Reference Appendix A.)

6.1 Definitions

Action Level

An exposure to an 8 hour time weighted average (TWA) of 85 decibels (or more) or a dose of 50% of PEL.

Administrative Controls

A procedure that limits daily exposure to noise by control of an employee's work schedule in a high noise environment.

Area Monitoring

The testing of a work area for noise by monitoring the noise in general locations without considering movement of the employee in and out of the different noise areas.

Audiogram

Chart, graph or table resulting from an audiometric test. This test shows an individual's hearing threshold levels.

Baseline Audiogram

An audiogram against which future audiograms are compared. This may also be called a reference, preplacement or entrance audiogram.

dBa

Decibels, A-weighted - A sound level reading in decibels made on an A-weighted network of a sound level meter (SLM) set to slow response.

Dose

The cumulative amount of noise that a person is exposed to over a certain period of time. Exposure to 95 dBA for 4 hours would be equivalent to a dose of 100% while exposure to 90 dBA for 8 hours would also be equivalent to 100%.

Engineering Controls

Any mechanical device or physical barrier that reduces the sound level at the source or along the path of transmission.

SAFETY POLICY & PROCEDURE

Hearing Conservation Program (HCP)

The program of employee protection against noise.

Noise Dosimeter

An electronic instrument that takes the various noise levels along with the exposure times and integrates them into one cumulative measurement that indicates the percentage of the safe dose for that time period.

Permissible Exposure Limit (PEL)

The exposure limit enforced by OSHA.

Personal Monitoring

The testing of a work area for noise by monitoring the individual employee's movement into and out of different work areas.

Sound Level Meter

An electronic instrument for the measurement of sound levels.

Standard Threshold Shift

An average hearing threshold shift of 10 dB or more in Shift (STS) either ear at 2000, 3000, and 4000 hertz. This may be temporary or permanent.

Time Weighted Average

The sound level which, if constant over an 8 hour (TWA) workday exposure, would result in the same noise dose as measured.

6.2 General Provisions

The general elements of a Hearing Conservation Program (HCP) are identified in the OSHA standard, 29 CFR 1910.95. These elements, as they pertain, are adopted for NCDOT as follows:

6.2.1 Monitoring

Monitoring will be provided by Safety and Loss Control whenever it is suspected that an employee's exposure routinely equals or exceeds an 8 hour TWA of 85 dBA or a dose of 50%.

This will include the monitoring of continuous, intermittent, and impulse sound between 80 and 130 decibels.

All instruments will be of the proper type and will be calibrated prior to use.

This monitoring will be repeated whenever a change in the work area occurs where additional employees are exposed above the action level or where the previously issued hearing protection becomes inadequate for protecting the employee.

SAFETY POLICY & PROCEDURE

6.2.2 Employee Rights

Employees will be notified in writing by their Division/Unit Manager or by Safety and Loss Control if exposed at or above the 85 dBA TWA.

Employees must be allowed to observe or have a representative observe area noise monitoring.

Once enrolled in the HCP, employees will receive an initial baseline audiogram and will be retested annually for as long as they remain enrolled. These tests will be conducted at no charge to the employee.

Employees may choose from a variety of styles of hearing protection and will be instructed in how to wear and maintain the protection selected.

Employees will have access to their monitoring and audiometric testing records.

6.2.3 Audiometric Testing

Audiometric testing will be provided to all employees whose exposure routinely exceeds an 8 hour Time Weighted Average (TWA) of 85 dBA.

Testing will be conducted by properly certified or licensed audiologists, otolaryngologists, physicians or technicians.

Whenever an employee is routinely exposed at or above the action level, a baseline audiometric test must be conducted within 6 months.

Audiometric tests must not be conducted until the employee has at least 14 hours without exposure to workplace noise (such as over a weekend) or has been furnished and has worn hearing protection for this period.

Annual retesting will be conducted if an employee continues to be routinely exposed to an 8 hour TWA of 85 dBA or more.

Retesting will include a comparison of an employee's baseline audiogram with the annual retest to determine if a threshold shift has occurred.

If a standard threshold shift is indicated, the employee will be notified in writing by Division/Unit management within 21 days.

6.2.4 Standard Threshold Shift (STS)

Any STS must be evaluated by a physician or other licensed professional to determine if it is work-related. This evaluation will be done at no cost to the employee.

SAFETY POLICY & PROCEDURE

Employees who are wearing hearing protection, who experience a STS, and who are already wearing hearing protection will be refitted and retrained on its use.

The NCDOT Audiometric Contractor will refer for additional clinical audiological or ontological examination any employee who has experienced a STS whom he suspects as having a medical problem that caused such a shift. Such referrals may also be made if the Contractor suspects that medical problems of the ear have been caused or aggravated by hearing protection.

When a STS has occurred, it must be recorded on the OSHA log 200 as an occupational illness. The date listed for the occupational illness will be the date that the STS is first diagnosed.

6.2.5 Hearing Protection

Employees will be provided with and required to wear hearing protection when exposed to 85 decibels or greater even if the employee has not had a baseline audiogram or experienced a STS.

All equipment and work areas identified at 85 dBA or above will be placarded or posted that hearing protection is required. Figure 1 presents examples of hearing protection signs that could be used in your facility or workplace.

Replace hearing protection whenever it becomes too worn to effectively protect the employee.



Figure 1

A variety of hearing protectors will be available for employee selection from inventory. See [SPP# 1910.132, Personal Protective Equipment](#), for related information.

Training on the use and care of hearing protection will be provided by the Division/Unit coordinator or Safety and Loss Control.

All hearing protection will be properly fitted and its use supervised.

Hearing protection must be adequate to reduce employee exposure to 90 dBA or below if no STS has occurred or to 85 dBA or below if a STS has occurred.

SAFETY POLICY & PROCEDURE

6.2.6 Training Program

Training programs include information on the effects of noise on hearing, the purpose of hearing protection, advantages, disadvantages and the characteristics of various types.

Training includes the proper selection, fitting, use and care of different varieties of hearing protection.

Training includes an explanation on the purpose and methods of audiometric testing.

Refresher training will be given annually for all employees included in the HCP.

6.2.7 Recordkeeping

Records on area noise testing exposure will be accurately maintained for 5 years.

All employee audiometric test records will be maintained for the duration of employment plus 5 years. Records will then be removed and handled according to the records retention policy.

Audiometric test records will include:

- a) Name and job classification
- b) Date of the audiogram
- c) Examiner's name
- d) Date of audiometer calibration
- e) Employee's most recent noise exposure assessment

Records will be provided on request to employees, former employees, and OSHA inspectors/auditors.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for coordinating required training with Safety and Loss Control.

Managers/Unit Heads are responsible for enrolling employees as required in this program.

Managers/Unit Heads are responsible for requesting monitoring from Safety and Loss Control as required for suspect areas identified by supervisors.

SAFETY POLICY & PROCEDURE

Managers/Unit Heads will notify employees within 21 days of receiving the report on their hearing tests or if the results of monitoring indicates the employee's routine 8 hour TWA exceeds 50% of the PEL. (Sample notification letters are provided in Appendix B.)

Managers/Unit Heads will ensure that engineering or administrative control alternatives are evaluated and implemented before employees are included in the HCP.

Managers/Unit Heads are responsible for budgeting for expenditures such as audiometric testing and employee training and for requesting required audiometric testing from the NCDOT Audiometric Contractor.

Managers/Unit Heads will ensure that employee audiometric test records are maintained in the unit personnel files and that copies are provided to Safety and Loss Control.

6.3.2 Supervisors

Supervisors are responsible for coordinating noise monitoring in their area with Safety and Loss Control through their Division/Unit office.

Supervisors will schedule employees for hearing tests and training if the employees are included in the HCP. Employees who are placed in a job where excessive noise levels (90 dBA or above) occur will be scheduled for audiometric tests within 90 days of their placement. This will include both new hires and employees transferred into high noise jobs.

Supervisors are responsible for enforcing the use of hearing protection through disciplinary action as prescribed in the NCDOT Workplace Safety Manual.

Supervisors will ensure that an adequate supply and variety of hearing protection is maintained in their inventory and that employees are reminded and transported for evaluation or treatment.

Supervisors will ensure that all cases where a STS occurs are recorded on the OSHA log 200 as an occupational illness.

6.3.3 Employees

Employees must inform their supervisor if a change occurs in the workplace that results in exposure to higher noise levels.

Employees will use noise control measures or will wear and maintain hearing protection as required.

SAFETY POLICY & PROCEDURE

Employees will attend training on noise exposure and the requirements of the HCP.

Employees included in the HCP will have medical evaluations and followup audiograms scheduled by NCDOT as a condition of employment.

Employees are to report any complicating medical problems to their supervisor as soon as possible.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide oversight, general administration, and monitoring of NCDOT's Audiometric Contractor's performance.

Safety and Loss Control will identify and monitor high noise areas.

All high noise areas and equipment measured at 85 dBA or greater in the field will be posted with warning labels or signs by Safety and Loss Control.

Records of work area noise testing will be maintained for 5 years by Safety and Loss Control.

Safety and Loss Control will assist the Central Equipment Unit in the development of purchasing specifications that address the noise levels of machinery.

Random checks of employee training, audiometric testing, and hearing protection use will be conducted to ensure the HCP is being implemented properly.

Questions that cannot be resolved by the unit supervisor or manager will be answered by Safety and Loss Control within 21 days of receipt of request.

Safety and Loss Control will work with Purchasing to obtain a variety of the most effective hearing protection available.

Training and orientation on the HCP will be provided by Safety and Loss Control. The basic elements of this training include:

- The effects of noise on hearing.
- The purpose, care, selection, fitting, and maintenance of hearing protectors.
- The results of any noise tests conducted in the work area.
- The purpose and methods of audiometric testing.

Audiometric test data will be reviewed and evaluated for trends or problems.

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Regulatory agencies will be monitored for future changes in the HCP requirements and NCDOT's program will be revised as necessary to reflect these changes.

6.3.5 Central Equipment Unit

Central Equipment Unit will support Divisions/Units with the selection and purchase of equipment and/or modification of equipment as required to reduce employee exposure to unacceptable noise.

First consideration will be given to modifying and obtaining equipment that meets NCDOT's requirements for an 8-hour work cycle maximum exposure of 85 dBA Time Weighted Average (TWA).

Central Equipment Unit will ensure that all equipment is properly labeled for noise hazards.

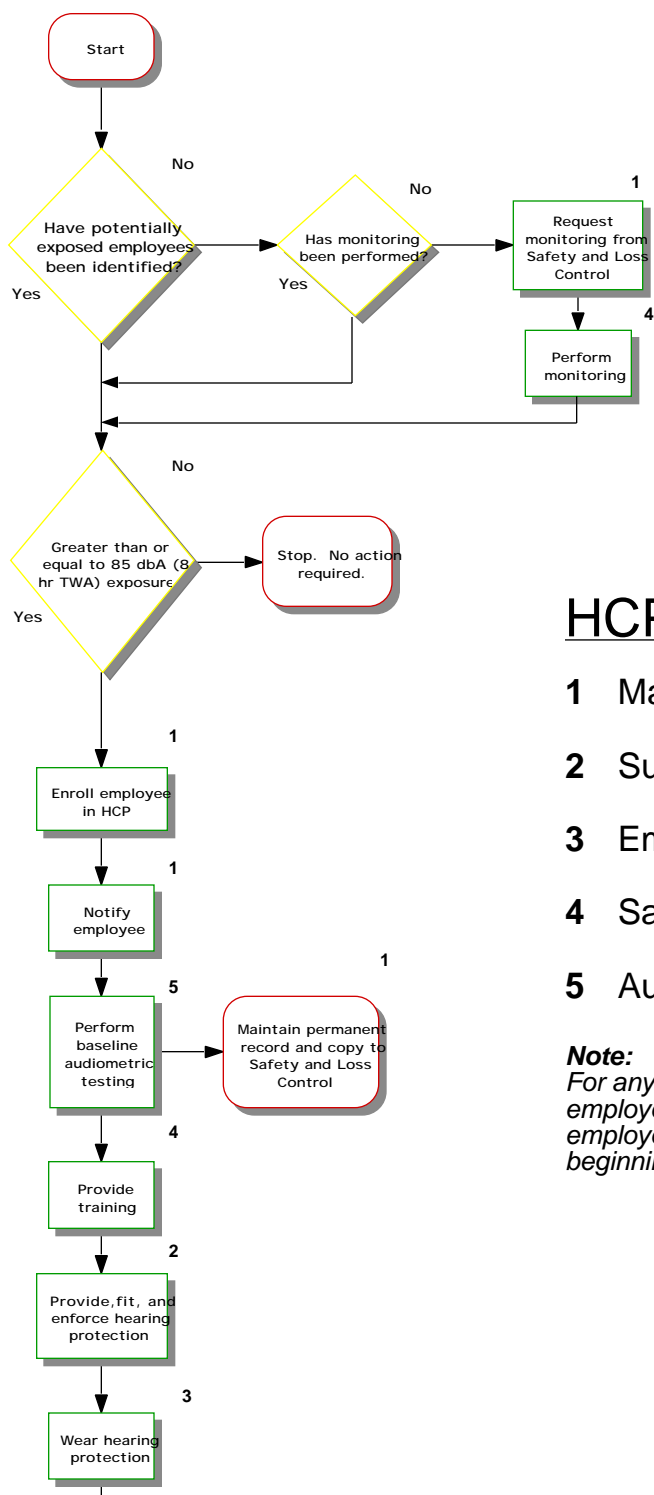
6.3.6 NCDOT Audiometric Contractor

The NCDOT Audiometric Contractor shall schedule and conduct baseline and annual audiometric tests at the request of the Division/Unit head.

The NCDOT Audiometric Contractor shall evaluate baseline and annual audiograms to establish a hearing threshold and annual retests will be compared to the baseline to determine if a STS has occurred.

The NCDOT Audiometric Contractor will comply with all requirements of the OSHA standard on hearing conservation including test location, equipment calibration, and recordkeeping requirements.

APPENDIX A: HCP Procedural Flow Chart



HCP Responsibility Legend

- 1 Managers/Unit Heads
- 2 Supervisors
- 3 Employees
- 4 Safety and Loss Control
- 5 Audiometric Contractor

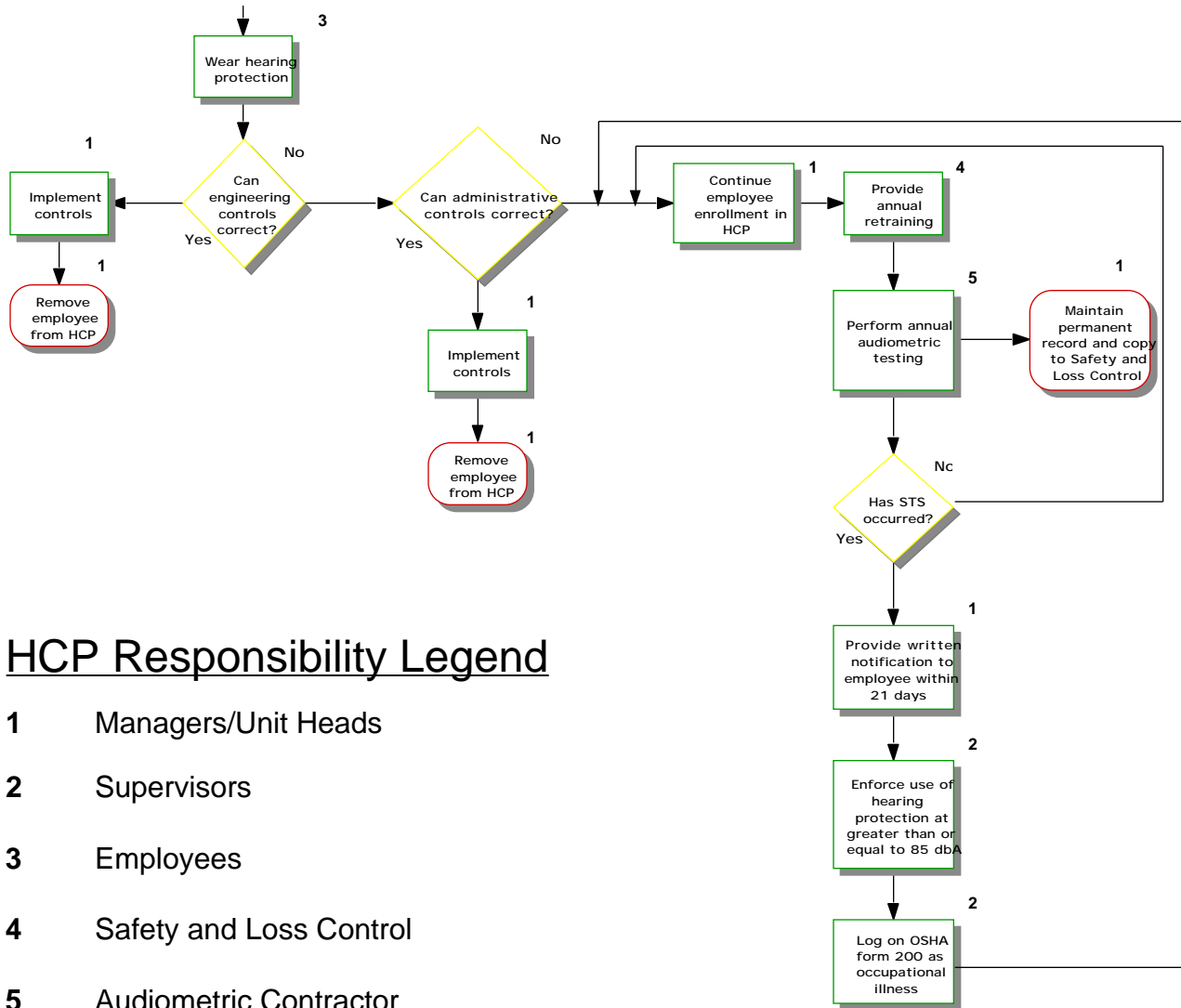
Note:

For any change in work environment or employee assignment that may effect employee noise exposure, reassess from beginning of flow diagram

Flowchart continued on next page

APPENDIX A: HCP Procedural Flow Chart (Continued) 2

Continued from previous page



HCP Responsibility Legend

- 1 Managers/Unit Heads
- 2 Supervisors
- 3 Employees
- 4 Safety and Loss Control
- 5 Audiometric Contractor

Note:

For any change in work environment or employee assignment that may effect employee noise exposure, reassess from beginning of flow diagram

SAFETY POLICY & PROCEDURE

APPENDIX B: Sample Letter 1

Dear Employee:

Hearing test results have been returned to this office. Four degrees of findings have been identified: Category I-Normal hearing, Category III- Mild to moderate hearing loss, Category IVT-Significant hearing loss identified and additional audiological testing recommended, and Category IVM-Significant hearing loss identified with possible medical involvement. Your hearing test, given on the above date, indicated a hearing loss with a possible medical involvement. It is recommended that you be examined for a complete otological examination.

We value your hearing abilities. We are committed to safeguarding all of our employees from hazardous conditions in the work site. Hearing protection will be a necessary part of your Personal Protective Equipment as you perform specific aspects of your job. Please see that you have the appropriate hearing protection device(s) and that the device(s) is (are) properly fitted prior to working in conditions that expose you to high noise levels.

If you have any questions, please advise your supervisor or contact _____.

When you have read this letter, please sign, date, and return the original copy to your supervisor.

Thank You,

Division Engineer

Employee's Signature

Date

SAFETY POLICY & PROCEDURE

APPENDIX B: Sample Letter 2

Dear Employee:

Hearing test results have been returned to this office. Four degrees of findings have been identified: Category I-Normal hearing, Category III- Mild to moderate hearing loss, Category IVT-Significant hearing loss identified and additional audiological testing recommended, and Category IVM-Significant hearing loss identified with possible medical involvement.

Your hearing test, given on the above date, indicated a significant hearing loss and additional testing is recommended (Category IVT).

We value your hearing abilities. We are committed to safeguarding all of our employees from hazardous conditions in the work site. Hearing protection will be a necessary part of your Personal Protective Equipment as you perform specific aspects of your job. Please see that you have the appropriate hearing protection device (s) and that the device (s) is (are) properly fitted prior to working in conditions that expose you to high noise levels.

If you have any questions, please advise your supervisor or contact _____.

When you have read this letter, please sign, date, and return the original copy to your supervisor.

Thank You,

Division Engineer

Employee's Signature

Date

SAFETY POLICY & PROCEDURE

APPENDIX B: Sample Letter 3

Dear Employee:

Hearing test results have been returned to this office. Four degrees of findings have been identified: Category I-Normal hearing, Category III- Mild to moderate hearing loss, Category IVT-Significant hearing loss identified and additional audiological testing recommended, and Category IVM-Significant hearing loss identified with possible medical involvement.

Your hearing test, given on the above date, indicated a mild to moderate hearing loss (Category III). No additional testing is recommended at this time.

We value your hearing abilities. We are committed to safeguarding all of our employees from hazardous conditions in the work site. Hearing protection will be a necessary part of your Personal Protective Equipment as you perform specific aspects of your job. Please see that you have the appropriate hearing protection device(s) and that the device (s) is (are) properly fitted prior to working in conditions that expose you to high noise levels.

If you have any questions, please advise your supervisor or contact _____.

When you have read this letter, please sign, date, and return the original copy to your supervisor.

Thank You,

Division Engineer

Employee's Signature

Date

Ventilation**SPP# 1910.94****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to provide guidelines for general and workplace ventilation to protect North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Certain indoor workplace operations in NCDOT can degrade the air quality such that it may have an adverse effect on employee health and productivity. However, good ventilation can supply or remove air to contribute to the comfort and efficiency of employees.

This safety policy and procedure provides guidelines for general and workplace ventilation to protect NCDOT employees who may be exposed to poor air quality in their workplace. It provides provisions for training, a discussion on general ventilation requirements, local exhaust ventilation requirements, and a detailed discussion of NCDOT workplace ventilation applications.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure applies but is not limited to the following operations in NCDOT:

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- Welding
- Confined Spaces
- Abrasive Blasting
- Grinding, Polishing, and Buffing
- Spray Finishing
- Vehicle Maintenance Shops
- Materials and Tests Chemical Lab

This safety policy and procedure also applies to all NCDOT employees affected by poor air quality due to ventilation and workplace conditions.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.94).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, adequate ventilation must be in place and operating properly wherever there is confirmed poor air quality in the workplace. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Ventilation will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's policy on Ventilation. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Ventilation.

6.1 Definitions

Clean Air

Air of such purity that it will not cause harm or discomfort to an individual if it is inhaled for extended periods of time.

Abrasive Blasting

The forcible application of an abrasive to a surface by pneumatic pressure, hydraulic pressure, or centrifugal force.

Exhaust Ventilation System

A system for removing contaminated air from a space.

Fan

Mechanical device that is used to move air.

Air Inlet

Opening through which outside air enters an enclosed space or building.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- General Ventilation
- Local Exhaust Ventilation
- NCDOT Workplace Ventilation Applications

6.2.1 Training

Employees who work in the workplace covered by this safety policy and procedure shall receive basic awareness training of:

- The importance of ventilation
- How to recognize poor air quality
- How the ventilation system(s) works in their job area

This training shall be done upon initial employment or job reassignment. Refresher training shall be at the discretion of the supervisor.

6.2.2 General Ventilation

General ventilation refers to the ventilation processes that provide thermal comfort and dilution. Thermal comfort ventilation is used to provide cooling and heating. Dilution ventilation is the process of using clean air to reduce the level of concentration of contaminants in a building or space.

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Thermal comfort ventilation is usually installed in NCDOT's office spaces, office buildings, and various other buildings and structures where no specific workplace activity is generating and introducing air contaminants into the indoor air space. Thermal comfort ventilation treats the air to control its temperature, humidity, cleanliness, and distribution.

Dilution ventilation moves contaminated air away from employees and moves fresh air by occupied areas toward contaminant sources. Dilution ventilation is normally used when local exhaust ventilation is impractical.

Dilution ventilation does not always reach local sites in a space where contaminant concentrations may exceed safe levels. If contaminants are highly toxic or very flammable, then dilution ventilation is not a good choice for contaminant control. Dilution ventilation works best where contaminant generation is uniform and the rate of generation is low. Figure 1 presents poor, fair, good, and best locations for fans and air inlets for dilution ventilation.

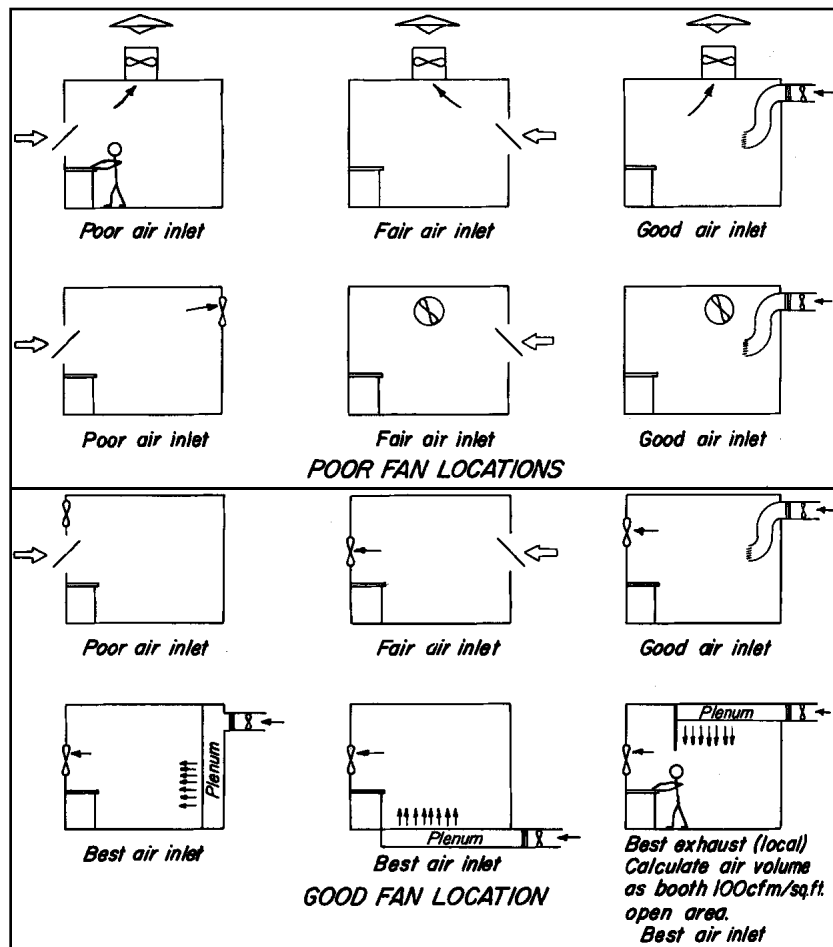


Figure 1

6.2.3 Local Exhaust Ventilation

Local exhaust systems operate on the principle of capturing a contaminant at or near its source.

Local exhaust systems are comprised of five basic components:

- The hood
- The duct system
- The air cleaning device
- The fan
- The stack

Figure 2 presents a typical local exhaust system configuration. The hood collects the contaminant in an air stream directed toward the hood. The duct system transports the contaminated air to the air cleaning device, if present, or to the fan. The stack disperses any remaining air contaminants. Figure 3 presents the types of hoods that are typically used with local exhaust systems.

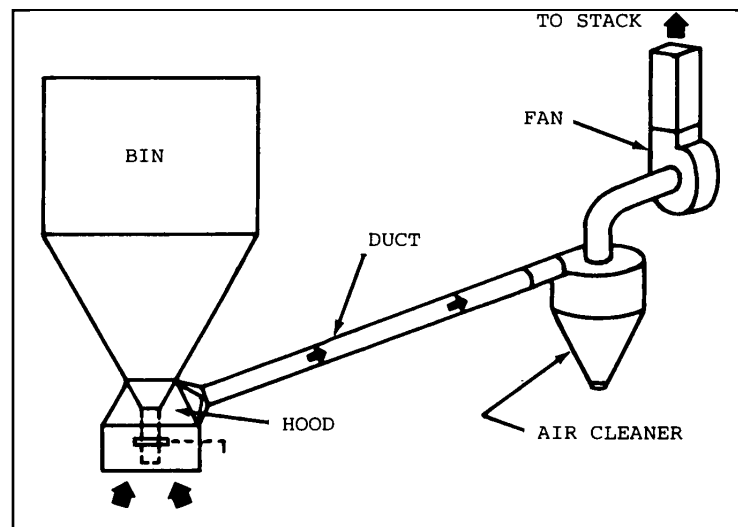


Figure 2

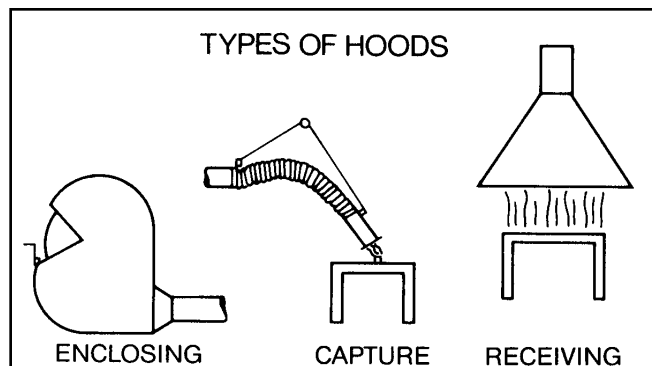


Figure 3

6.2.4 NCDOT Workplace Ventilation Applications

The NCDOT workplace ventilation applications include:

- Welding
- Confined Spaces
- Abrasive Blasting
- Grinding, Polishing, and Buffing
- Spray Finishing Operations
- Vehicle Maintenance Shops
- Materials and Tests Chemical Labs

Welding activities require ventilation if all of the following conditions exist:

- The welding space is less than 10,000 cubic feet (ft³) per welder
- The ceiling height is less than 16 feet
- The welding space contains partitions, balconies, or other structural barriers that obstruct cross-ventilation

Welding ventilation options include local exhaust, local forced, or dilution ventilation. Local exhaust ventilation is preferred. Dilution ventilation is usually not satisfactory but if it is used, it should be at a rate of 2,000 cubic feet (ft³) per minute per welder. Local exhaust hoods should be freely movable and be placed as near as practical to the work being welded. See [SPP # 1910.252, Welding](#), for related information.

Natural ventilation is sufficient for welding if all the following conditions exist:

- The welding space is more than 10,000 cubic feet (ft³) per welder
- The ceiling height is greater than 16 feet
- The welding space contains no partitions, balconies, or other structural barriers

Confined spaces can have a variety of hazards. Therefore, ventilation measures should match the hazards that are present. Typically air flushing (purging or replacement) is first performed to lower any toxicity, flammability, and/or threshold limit values to safe levels.

Figure 4 illustrates a typical ventilation flush and purge operation for a confined space. Figure 5 illustrates recommended duct positions for uniform dilution and elimination of hazardous atmospheres. If the flush and purge ventilation is not successful in lowering the toxicity, flammability and/or threshold limit values, then PPE with air supplied or self contained air respirators should be specified to match the hazard. See [SPP# 1910.146, Confined Space Entry](#) for related information.

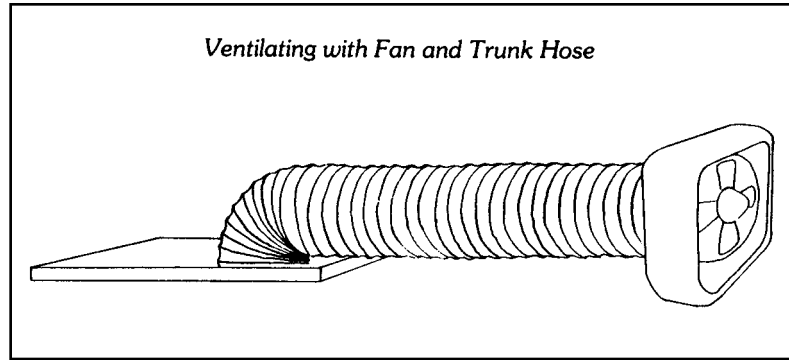


Figure 4

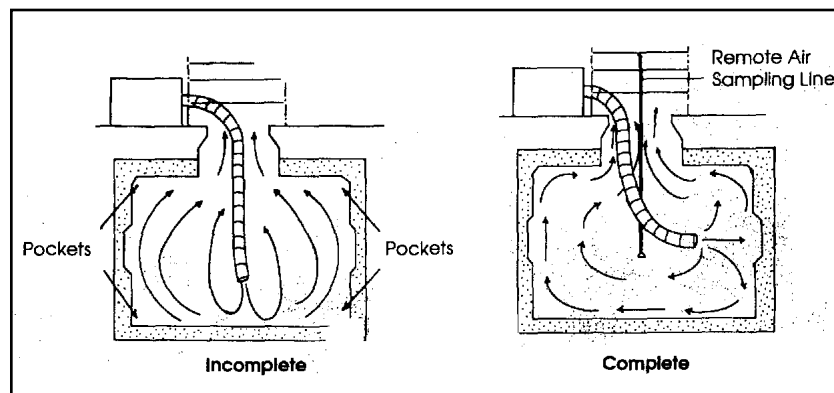


Figure 5

Abrasive blasting operations pulverize and shatter materials into fragmented material pieces and respirable size dusts. Therefore, this operation should be performed in an enclosure (e.g., room, etc.) with exhaust ventilation that will promptly capture the abrasive dust particles.

The exhausted air from the abrasive blasting operation shall be discharged through dust collecting equipment or any type of air cleaning device. The accumulated dust should be periodically emptied and removed without contaminating other work areas.

Grinding, polishing, and buffing equipment can include several types of equipment in various configurations. Grinding, polishing, and buffing configurations used in NCDOT include:

- General grinding wheel
- Horizontal single-spindle disc grinder
- Horizontal double-spindle disc grinder
- Swing-frame wheel grinder
- Vertical spindle disc grinder
- Polishing and buffing wheels

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Each of these configurations have minimum required exhaust volumes based on wheel or disc diameter size. Exhaust ventilation systems will be required on these configurations whenever employee exposure to an air contaminant exceeds its threshold limit value or permissible exposure level. All hoods that are connected to the exhaust system shall be located such that all dirt and dust particles shall fall and be projected into the hoods away from the operator's breathing zone.

Spray finishing operations in NCDOT include spray booths and spray rooms. Spray rooms include those areas where spray finishing operations are performed in an enclosed separated area. Both spray booths and spray rooms are used to enclose or confine all spray finishing operations. Spray finishing application configurations include:

- Electrostatic
- Automatic airless
- Air-operated guns, manual or automatic

An adequate air replacement system inside the spray booth or spray room shall be in place to introduce replacement air upstream or above the object being sprayed.

Exhausted air from the spraying operation shall dilute the solvent vapor to 25 percent of the lower explosive limit of the solvent being sprayed. Appendix A presents the lower explosive limits of common solvents and a formula to determine the cubic feet air volume required to dilute a vapor to 25 percent of the lower explosive limit. See [SPP# 1910.107, Spray Finishing](#), for related information.

Vehicle maintenance shops in NCDOT include areas where vehicles are parked while maintenance is being performed. Flexible exhaust hoses shall be available to install on vehicle tailpipes. These flexible exhaust hoses should exhaust to a common duct and eventually exhaust to the outside air at roof level. This practice minimizes the buildup of carbon monoxide emissions in the vehicle maintenance shop. All flexible exhaust hoses should be in good condition and contain no punctures.

Materials and Tests Chemical laboratory has a number of chemicals that can present health hazards when used. Flammable gases, toxic, or noxious odor chemicals should be handled under a laboratory fume hood.

The laboratory fume hood should be designed and located such that an adequate air capture velocity will draw all hazardous vapors out of employee's breathing zones. Cross and room drafts across the hood may alter its effectiveness. These cross and room drafts should be minimized.

A narrow strip of tissue paper can be used to indicate that the hood is operating properly. The paper should be lowing (bent) towards the air intake. See [SPP# 1910.1450, Exposure to Hazardous Chemicals in Laboratories](#), for related information.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of ventilation equipment and related supplies. They will also be responsible for identifying the employees and workplaces affected by this safety policy and procedure and will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that proper and adequate ventilation configurations are installed for the workplace applications outlined in this safety policy and procedure. They will also ensure that employees are not allowed to work in these workplace applications if proper and adequate ventilation is not in place.

6.3.3 Employees

Employees shall report workplace conditions requiring ventilation to their immediate supervisor. Additionally, employees shall comply with all the applicable guidelines contained in this safety policy and procedure.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased ventilation equipment comply with this safety policy and procedure and current safety regulations.

The Industrial Hygienist will provide technical guidance on:

- Existing ventilation system configurations to ensure they are designed and operating properly
- Design of new ventilation systems prior to installation

The Industrial Hygienist and Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

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APPENDIX A: Lower Explosive Limit of Commonly Used Solvents

Solvent	Cubic feet per gallon of vapor (V_{CF}) of liquid at 70° F.	Lower explosive limit (LEL) in percent by volume of air at 70° F.
Acetone	44.0	2.6
Amyl Acetate (iso)	21.6	1.0
Amyl Alcohol (n)	29.6	1.2
Amyl Alcohol (iso)	29.6	1.2
Benzene	36.8	1.4
Butyl Acetate (n)	24.8	1.7
Butyl Alcohol(n)	35.2	1.4
Butyl Cellosolve	24.8	1.1
Cellosolve	33.6	1.8
Cellosolve Acetate	23.2	1.7
Cyclohexanone 1,1	31.2	1.1
Dichloroethylene 1,2	42.4	5.9
Dichloroethylene	42.4	9.7
Ethyl Acetate	32.8	2.5
Ethyl Alcohol	55.2	4.3
Ethyl Lactate	28.0	1.5
Methyl Acetate	40.0	3.1
Methyl Alcohol	80.8	7.3
Methyl Cellosolve	40.8	2.5
Methyl Ethyl Ketone	36.0	1.8
Methyl n-Propyl Ketone	30.4	1.3
Naphtha (VM&P) (76° Naphtha)	22.4	0.9
Naphtha (100° Flash) Safety Solvent	23.2	1.0
Propyl Acetate (n)	27.2	2.8
Propyl Acetate (iso)	28.0	1.1
Propyl Alcohol (n)	44.8	2.1
Propyl Alcohol (iso)	44.0	2.0
Toluene	30.4	1.4
Turpentine	20.8	0.8
Xylene	26.4	1.0

APPENDIX A: Lower Explosive Limit of Commonly Used Solvents (Continued) 2

To determine the volume of air in cubic feet necessary to dilute the vapor from 1 gallon of solvent to 25 percent of the lower explosive limit, use the following equation:

$$V_D = \frac{4(100 - \text{LEL}) (V_{CF})}{\text{LEL}}$$

Where: V_D = Dilution volume required per gallon of solvent

LEL = Lower explosive limit for a given solvent

V_{CF} = Cubic feet of vapor per gallon

Example:

Using toluene as the solvent:

LEL of toluene is 1.4 percent

V_{CF} of toluene is 30.4 cubic feet per gallon

Then,

$$V_D = \frac{4(100 - 1.4)(30.4)}{1.4} = 8,564 \text{ cubic feet}$$

Electrical Protective Devices**SPP# 1910.137****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish the guidelines for the use of Electrical Protective Devices within North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Selected NCDOT employees work around electrical energy in the performance of their jobs. Electrical Protective Devices are a special class of Personal Protective Equipment (PPE). This special class of PPE provides a nonconductive barrier for employees who work near and around hazardous electrical energy sources.

This safety policy and procedure includes provisions for training, discussion on the importance of using and testing rubber insulating gloves, requirements on rubber matting, and conditions for rubber matting replacement.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects all Traffic Services Technicians, Bridge Maintenance, and Electrical employees who as a result of their job duties work on energized equipment. In addition, it covers employees who could possibly be exposed to energized equipment.

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3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.137).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, work will not be performed around hazardous electrical energy sources without the proper electrical protective devices. When energy hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Electrical Protective Wear will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Electrical Protective Devices. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Electrical Protective Devices.

6.1 Definitions

Breakdown

The electrical discharge or arc occurring between the electrodes and through the equipment being tested.

Electrical Devices

Any equipment or device that is charged or operated by electrical current and has the potential for release of energy while repairs or maintenance are being performed.

Flashover

The electrical discharge or arc occurring between electrodes and over or around, but not through, the equipment being tested.

Ozone

A very active form of oxygen which may be produced by corona, arcing, or ultraviolet rays.

Personal Protective Equipment (PPE)

In reference to this policy, PPE will include isolation equipment such as insulating rubber gloves and insulating rubber matting.

Rubber

A generic term that includes elastomers and elastomeric compounds, regardless of origin.

Voltage, Maximum Use

The AC voltage rating of the protective equipment that designates the maximum nominal design voltage of the energized system that may be safely worked.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Use of Rubber Insulating Gloves
- Testing of Rubber Insulating Gloves
- Use of Rubber Matting
- Rubber Matting Replacement

6.2.1 Training

Employees who work around hazardous electrical energy shall be trained in:

- Hazards associated with electrical energy
- Use of electrical protective equipment
- Limitations of electrical protective equipment

6.2.2 Use of Rubber Insulating Gloves

Two types of rubber insulating gloves will be used by NCDOT as a portable device for protecting employees from contact with live electrical conductors:

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- Low voltage, Type I (being non-resistant to ozone breakdown), Class 0 (capable of withstanding 5,000 volts)
- High voltage, Type I (being non-resistant to ozone breakdown), Class 1 (capable of withstanding 10,000 volts)

Insulating rubber gloves are required to prevent employee electrocution from accidental contact with energized equipment. They shall not be used as primary protection. Primary protection measures include grounding and deactivation. Rubber gloves must be visually inspected prior to each use to verify integrity and electrical continuity tests. Each glove must be conspicuously marked with last test date and expiration date.

In addition to rubber gloves, leather gloves will be worn over rubber gloves to ensure they are not punctured or damaged during their use.

6.2.3 Testing of Rubber Insulating Gloves

Rubber insulating gloves will be tested annually to ensure that their protective ability against shock has not been compromised. This testing will be performed by Safety Test Co., located in Shelby, North Carolina. The gloves will be approved and stamped for use or replaced when necessary.

6.2.4 Use of Rubber Matting

Employees working on energized or potentially dangerous equipment will be provided with rubber matting on which to stand. This matting will be capable of withstanding an electrical charge of 30,000 volts.

6.2.5 Rubber Matting Replacement

Rubber matting will be replaced on an annual basis (without testing) to ensure its capability to eliminate injury.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that adequate funds are available and budgeted for the purchase of electrical protective devices in their areas. They will also identify the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

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6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are provided with the proper PPE for their jobs.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased electrical protective equipment complies with current safety regulations.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Personal Protective Equipment

SPP# 1910.132

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1.0 Purpose

The purpose of this safety policy and procedure is to eliminate or minimize North Carolina Department of Transportation (NCDOT) employee exposure to work hazards.

2.0 Scope and Applicability

The use of Personal Protective Equipment (PPE) to eliminate injuries is an important component of NCDOT's safety program. PPE includes all clothing and accessories designed to create a barrier against workplace hazards. PPE should be considered a means of controlling hazards only after engineering controls, administrative controls, and safe work practices have been implemented.

This safety policy and procedure establishes the methods and accountability for

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implementing the NCDOT Personal Protective Equipment (PPE) Program. It provides guidelines for selecting PPE based on the hazard. It includes provisions for training and discussion on the need for hazard assessments. It also presents PPE requirements for the head, eye and face, ear, hand, foot and leg, body and respiratory system. Additionally, this safety policy and procedure presents discussion on fall protection requirements and the use and maintenance of PPE.

This document details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any employee who is exposed to hazards that require PPE.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.132-137) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.95-107).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. PPE shall be specified, appropriate to the hazard, only after engineering practices, administrative practices, and safe work practices have been implemented to control the hazard(s). Proper training regarding PPE will also be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on PPE. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

It is the responsibility of NCDOT to provide and maintain equipment that is adequate and is safe in design and construction.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's policy on PPE.

6.1 Definitions

ANSI

American National Standards Institute.

PPE

Personal Protective Equipment.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Hazard Assessment
- Head Protection
- Eye and Face Protection
- Ear Protection
- Hand Protection
- Foot and Leg Protection
- Body Protection
- Respiratory Protection
- Fall Protection
- Use and Maintenance

6.2.1 Training

Training will be provided in the use of PPE.

Employees will be trained in:

- Hazard awareness
- When PPE is necessary
- How to don, remove, adjust, and wear PPE
- Limitations of PPE
- Proper care, maintenance, useful life, and disposal of PPE

Refresher training will be given annually. All employees must be trained before the specific PPEs are put into use. No employee shall be at risk at any time without knowledge of the proper PPEs to reduce the risk. Additionally, supervisors will be trained in conducting hazard assessments to ensure the appropriate PPE is matched to the hazard.

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6.2.2 Hazard Assessment

A hazard assessment will be performed in the workplace to determine and identify all hazards that would necessitate PPE.

Typically, the hazard assessment will consist of:

- A walk-through survey to identify hazard sources based on general hazard categories
- Observation of the sources
- Organizing data from the survey
- Analyzing data from the survey

The basic hazard categories that should be considered in the walk-through survey are:

- Impact
- Penetration
- Compression (roll-over)
- Chemical
- Heat
- Harmful dust
- Light (optical radiation)

Appendix A presents a hazard assessment form for use throughout NCDOT. This hazard assessment form can provide the user with a formal and accurate assessment of worksite hazards. This form focuses on head, eye and face, hand and arm, and foot and leg hazards. Forms of hazard assessments are already in place in NCDOT's Hearing Conservation Program (noise hazards), [SPP# 1910.95](#), and Respirator Program (respiratory hazards), [SPP# 1910.134](#).

Keys to hazard assessment are recognizing, evaluating, and controlling hazards. During the assessment a determination will be made if the hazard can be eliminated.

Wherever possible, engineering and administrative controls should be used first to eliminate or reduce employees' exposure to any workplace hazard.

If hazards are present, then a hazard analysis shall be done so NCDOT can:

- Select the types of PPE that will protect the affected employee from the identified hazards
- Communicate selection decisions to each affected employee
- Select PPE that properly fits each affected employee

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Appendix B presents hazard analysis forms which determine the highest overall hazards and helps select the appropriate PPE for those hazards. The hazard analysis provides a convenient format and methodology for organizing and analyzing data from the hazard assessment.

6.2.3 Head Protection

Hard hats protect employees from head injuries caused by falling or flying objects, bump hazards in close or confined spaces, and electrical shocks or burns. The hard hat should be easily adjustable so employees will wear the hat properly.

NCDOT hard hats should:

- Resist a reasonable impact force without breaking or collapsing the shell or damaging the internal suspension
- Dissipate and/or absorb as much impact force as possible to avoid transmitting the force to the head, spinal column, or other parts of the body
- Resist impact penetration
- Provide electrical protection as applicable

NCDOT hard hats are designated either as Class A or Class B hard hats. Class A hard hats provide protection against impact and falling or flying objects. Class B hard hats protect the head against high voltage electricity. All NCDOT hard hats should be disposed of whenever the helmet has received impact or shows signs of deterioration.

It is mandatory that hard hats be worn in all construction areas, including roads, shops, and outlying work areas where there is the potential exposure to falling or flying material. Additionally, Class B hard hats shall be worn where employees are exposed to overhead electrical conductors which could contact their heads.

6.2.4 Eye and Face Protection

Eye injuries are caused by flying particles, cuts, chemicals, injurious light, heat rays, and blows to the face and eyes. To prevent such injuries, many types of eye and face protection devices are available in NCDOT.

There are three basic types of eye and face protection used in NCDOT. These are :

- Safety glasses (with or without side shields)
- Goggles
- Face shields

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Eye and face protection devices should protect against the intended hazard and be:

- Reasonably comfortable
- Fit properly
- Durable
- Capable of being disinfected
- Easy to clean
- In good repair

The eye and face protection required will depend upon the potential hazards. Appendix C presents an Eye and Face Protection selection chart for use within NCDOT.

All NCDOT employees must use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

6.2.5 Ear Protection

Exposure to high noise levels can cause hearing loss or impairment. There is no cure for noise-induced hearing loss, so the prevention of excessive noise exposure is required to avoid hearing damage.

Types of ear protection devices used in NCDOT include:

- Ear plugs
- Ear muffs

There are a variety of earplugs available from NCDOT inventory. For specific requirements of information on NCDOT's hearing conservation program, see [SPP# 1910.95](#).

6.2.6 Hand and Arm Protection

Hand and arm injuries are a significant component of workplace injuries. Hands and fingers are used to accomplish nearly all workplace activities and must be protected from injury. The types of hand and arm protective wear used in NCDOT include:

- Cut-Resistant
- High and Low Temperature
- Splinters, Cuts, and Abrasions

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- Electrical Protection
- Repetitive Motion and Vibration
- Chemical Resistant

The required hand and arm protective wear will be based upon the hazard of the risk.

Appendix D presents details on the types of hand and arm protective wear used in NCDOT. Also, see [SPP # 1910.137, Electrical Protective Wear](#), for further details on electrical protection gloves.

NCDOT will select and require the use of hand protection against skin absorption of harmful substances, severe abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes.

6.2.7 Foot and Leg Protection

Safety shoes are used to protect the feet against injuries from heavy falling objects, rolling objects, objects piercing the soles, electrical hazards, against crushing or against lacerations. They are required for employees whose job duties require the lifting, carrying, or moving of objects weighing more than fifteen pounds.

NCDOT employees who are required to wear safety shoes will be reimbursed for a pair for safety shoes. Contact Safety and Loss Control to request reimbursement forms and further details.

There are many styles of shoes available as well as different materials and construction. Special safety shoes without laces or eyelets and with leather or heat and flame resistant material can be obtained for protection where molten metal and/or welding sparks are a hazard. Where there is a hazard from protruding nails or sharp objects on the walking surface, safety shoes should be equipped with metal inner soles. For electrical workers and those who have to work in classified or security areas, nonmetal toe guards, eyelets, and other shoe construction components are available.

Lightweight metal or plastic toe and/or instep shoe caps offer protection where marginal foot hazards exist. These devices can be quickly slipped on over safety or street shoes. They are not intended to replace safety shoes.

Storm rubbers that slip over the safety shoe provide a non-skid tread for fall protection on slippery walking surfaces. Storm rubbers also provide excellent protection for inside or outside work where water, oil, or chemicals could damage the safety shoe outer shell.

Over-the-sock or over-the-safety shoe boots are available. Boot outer shell materials include PVC, rubber, butyl, and neoprene. Temperature, abrasion, and chemical exposures in the workplace must be considered in the selection of the material.

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Protective spats and leggings offer protection against high heat, flame, molten metal splashes, hot sparks, and chainsaw cuts. Material construction includes leather, flame retardant duck, aluminized rayon, and other aluminized fabrics. Quick release legging velcro closures should be used when any emergency would require the legging to be quickly removed.

NCDOT employees shall use appropriate footguards, safety shoes, or boots and leggings for protection of feet and legs from falling or rolling objects, sharp objects, molten metal, hot surfaces, and wet slippery surfaces.

6.2.8 Body Protection

Protective clothing is used to protect the body from potential exposures associated with work.

Personal protective vests, aprons, coats, pants, coveralls, and suits are available in a wide range of materials and shall be worn consistent with the workplace hazard. Protective clothing shall include but not be limited to cooling vests and suits, foul weather gear, knife cutting protection, high visibility vests flotation vests, welding and high heat protective clothing.

NCDOT will require the use of protective clothing for those employees who are exposed to body hazards. Examples include employees in laboratories, welders, employees in special processing areas or employees exposed to other body hazards.

6.2.9 Respiratory Protection

The workplace can present hazards to the lungs. Some of the most common hazards are the lack of oxygen and the presence of harmful dust, fogs, smokes, mists, fumes, gases, vapors, or sprays. Respirators prevent the entry of harmful substances into the lungs during breathing. Some respirators also provide breathable air so work can be performed where there is inadequate oxygen.

The prevention of atmospheric contamination at the worksite should be accomplished as far as feasible by engineering control measures (such as enclosing or confining the contaminant-producing operation, exhausting the contaminant, or substituting with less toxic materials). However, when engineering controls are not feasible, appropriate respirators must be used.

Respirators have their limitations and are not substitutes for effective engineering controls. No employee shall wear a respirator until he or she has completed the Respiratory Control Program. Refer to [SPP #1910.134, Respiratory Protection](#), for further details.

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6.2.10 Fall Protection

Fall Protection devices are those devices and systems designed to catch and hold a person after an accidental fall from height. When a person does fall, the proper fall arrest safety system can protect the worker.

The following fall protection devices are used in NCDOT:

- Safety Belts and Harnesses
- Safety Nets
- Lanyards, Deceleration Devices, and Lifelines
- Ladder Climbing Safety Devices

Figure 1 illustrates a typical safety harness. Safety belts or harnesses attached to a structure or lifeline are primary lifesaving devices for employees who work at high elevations. For work at low elevations, such as in confined spaces, the safety belt and lanyard system can be used to retrieve an injured or incapacitated person as shown in Figure 2.

The types of safety belts and harnesses used in NCDOT include:

- Waist belt (2 feet or less free fall)
- Chest-waist harness
- Full body harness (free fall between 2 to 6 feet)
- Suspension belts (independent work support to suspend a worker)

When workers are exposed to falls during bridge construction, safety nets may be used. Safety nets are generally viewed as backup safety devices rather than primary life saving devices. Safety nets are required when workplaces are more than 25 feet above ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or safety belts is impractical.

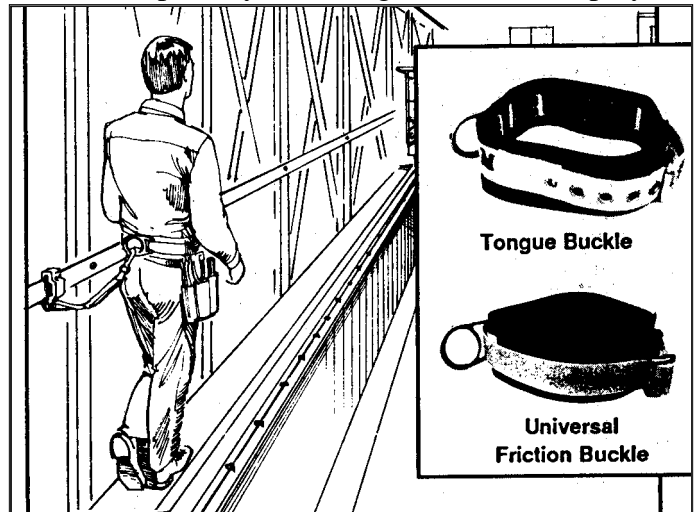


Figure 1



Figure 2

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A lanyard is a flexible line of rope, wire rope, or strap used to secure the body belt or body harness to a deceleration device, lifeline, or anchorage. Self-retracting lifelines and lanyards can limit a free fall to less than two feet. These devices allow the worker to move about while working. If a fall does occur, the device locks and suspends the worker until rescue is accomplished.

Ladder safety climb systems combine the safety belt and lanyard with a rope or rail type grab device. Ladder safety climb devices can be used on high structures to provide the user safety as well as a system that reduces the effort required to climb very high ladders.

NCDOT requires the use of fall protection equipment during bridge construction, bridge inspection, and other work activities where an employee can fall from elevated surfaces.

6.2.11 Use and Maintenance

All PPE must be kept clean and in reliable condition. PPE that is damaged or deemed to be not safe, must be replaced. All employees are to be trained properly in the use, proper maintenance, and disposal of PPE.

Items which are fitted to the individuals shall not be reissued to other employees nor are they to be shared. Items that are owned by the employee and used on the job must be certified safe and reliable by NCDOT.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of PPE in their areas. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with PPE through their auditing process.

6.3.2 Supervisors

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are properly trained before using PPE and that they are being worn properly. Supervisors will ensure that no employee is allowed in a work environment without the proper protective equipment consistent with the hazard.

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6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees are to report any unsafe act associated with this safety policy and procedure to their supervisors. Additionally, employees shall identify and report any hazards which may require PPE.

Employees who are assigned PPE are to keep them available and in good working order at all times and to have them replaced when they become worn or unsafe.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also provide assistance in performing hazard assessments.

Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased PPE comply with current safety regulations.

Safety Engineers will conduct hazard assessments and train other designated employees to perform hazard assessments. Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will support the Divisions/Units with the selection and purchasing of PPE.

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APPENDIX A: Hazard Assessment Form

Name_____ Job Title_____

Facility_____ Date _____

General

It is necessary to assess head, eye and face, hand, and foot hazards that exist in a worksite operation so the protective devices can be matched to the appropriate hazard. Therefore, a walk-through survey should be performed of the areas in question. During the walk-through survey, the user of this form should identify the sources of these hazards and observe the following hazard sources during the walk-through:

- Sources of motion (machinery or processes)
- Sources of high temperatures
- Types of chemical exposures (fumes, splashes, contact)
- Sources of harmful dust
- Sources of light radiation (welding, brazing, cutting, high intensity lights, etc.)
- Sources of falling objects or potential for dropping objects
- Sources of sharp objects
- Sources of rolling or pinching objects
- Sources of electrical hazards

Exercise **common sense** and **appropriate expertise** when performing the hazard assessments and analyses. Also note if any of the hazard(s) can be eliminated.

Head Hazards

Examine areas where impact and penetration hazards may be present due to falling objects and/or low head room clearance. Examples may include working below other workers who are using tools and materials that may fall; and working below machinery which may cause material or objects to fall. Additionally, look at areas where work on energized conductors is taking place.

Check the appropriate box for each hazard.

	Yes	No	Description of Hazards_____
Impact	<input type="checkbox"/>	<input type="checkbox"/>	_____
Penetration	<input type="checkbox"/>	<input type="checkbox"/>	_____
Electrical shock	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other_____	<input type="checkbox"/>	<input type="checkbox"/>	_____

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APPENDIX A: Hazard Assessment Form (Continued) 2

Eye and Face Hazards

Examine woodworking, machinery, welding, and chemical handling operations as a start.

Check the appropriate box for each hazard.

	Yes	No	Description of Hazards_____
Impact	<input type="checkbox"/>	<input type="checkbox"/>	_____
Potential of flying objects	<input type="checkbox"/>	<input type="checkbox"/>	_____
Chemical splash	<input type="checkbox"/>	<input type="checkbox"/>	_____
Chipping, hammering, etc.	<input type="checkbox"/>	<input type="checkbox"/>	_____
Torch cutting and brazing	<input type="checkbox"/>	<input type="checkbox"/>	_____
Welding	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other_____	<input type="checkbox"/>	<input type="checkbox"/>	_____

Hand and Arm Hazards

Examine work activities where chemicals, surface heat, radiant heat, extreme cold, splinters, abrasion, cuts and electrical shock exists or where the potential exists.

Check the appropriate box for each hazard.

	Yes	No	Description of Hazards_____
Penetration	<input type="checkbox"/>	<input type="checkbox"/>	_____
Chemical	<input type="checkbox"/>	<input type="checkbox"/>	_____
Temperature	<input type="checkbox"/>	<input type="checkbox"/>	_____
Electrical shock	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other_____	<input type="checkbox"/>	<input type="checkbox"/>	_____

Foot and Leg Hazards

Examine work activities where falling or rolling objects, sharp objects, molten metal, hot surfaces, chainsaw operations, and wet slippery surfaces exist.

Check the appropriate box for each hazard.

	Yes	No	Description of Hazards_____
Impact	<input type="checkbox"/>	<input type="checkbox"/>	_____
Penetration (Puncture)	<input type="checkbox"/>	<input type="checkbox"/>	_____
Compression (Rollover)	<input type="checkbox"/>	<input type="checkbox"/>	_____
Chemical	<input type="checkbox"/>	<input type="checkbox"/>	_____
Temperature	<input type="checkbox"/>	<input type="checkbox"/>	_____
Electrical shock	<input type="checkbox"/>	<input type="checkbox"/>	_____
Slippery conditions	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other_____	<input type="checkbox"/>	<input type="checkbox"/>	_____

Once the hazard assessment is complete, then perform the hazard analysis as listed in Appendix B.

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APPENDIX B: Hazard Analysis

A hazard analysis cannot be performed until a hazard assessment has been completed. The steps in performing a hazard analysis are:

- Summarize the description of hazards from the hazard assessment form and place this summary in the upper right hand corner of the hazard analysis form.
- Estimate the level of risk for each hazard category based on:
 - Your observations
 - The results from the hazard assessment
 - The following **Level of Risk** scaleEnter that value into column A.
- Estimate the seriousness of potential injury (if injury would occur, how serious would it be) for each hazard category based on:
 - Your observations
 - The results from the hazard assessment
 - The following **Seriousness of Personal Injury** scaleEnter that value into column B.
- Calculate the risk/injury factor for each hazard category (Column A x Column B) . Enter the calculated risk/injury factor into the **Risk/Injury Factor** column.
- Total all the values in the **Risk/Injury Factor** column to arrive at the Total Risk/Injury Factor for that hazard group.
- Recommend and select the appropriate PPE to protect against the hazards based on:
 - Knowledge of available PPE and what it can do
 - The calculated risk/injury factor
- Summarize the required PPE for the hazard group.

Templates for the hazard groups are provided. The hazard groups with the higher risk/injury factors require closer attention. (A sample hazard analysis is presented on the following page.)

Level of Risk

1	2	3	4	5
<i>None</i>	<i>Little</i>	<i>Moderate</i>	<i>Moderate to High</i>	<i>High</i>

Seriousness of Personal Injury

1	2	3	4	5
<i>Minor:</i> First Aid; No lost time	<i>Minor:</i> Minimal lost time; Quick return to regular job	<i>Medium :</i> Some lost time; Slower return to regular job	<i>Medium to Serious :</i> More lost time; Light duty work before returning to regular job	<i>Serious:</i> Significant lost time; Rehabilitation and light duty work required before returning to regular job

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APPENDIX B: Hazard Analysis (Continued) 2

(Sample Hazard Analysis)

Hand and Arm Hazards



Description of Hazards Material handling
of sharp objects and wood-working duties.

Hazard Category	Level of Risk (A)	Seriousness of Potential Injury (B)	Risk/Injury Factor (A x B)	Recommended Personal Protective Equipment
Penetration	4	5	20	Cut-resistant gloves, general use and splinter-resistant gloves
Chemical	2	2	4	Have chemical resistant gloves available
Temperature	2	1	2	None
Electrical shock	1	1	1	None
Other				None

Total Risk/Injury Factor 27

Summary of required PPE

Cut resistant general use gloves and chemical resistant
gloves available as needed.

Head Hazards



Description of Hazards _____

Hazard Category	Level of Risk (A)	Seriousness of Potential Injury (B)	Risk/Injury Factor (A x B)	Recommended Personal Protective Equipment
Impact				
Penetration				
Electrical shock				
Other				

Total Risk/Injury Factor _____

Summary of required PPE

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APPENDIX B: Hazard Analysis (Template) (Continued) 3

Eye and Face Hazards



Description of Hazards _____

Hazard Category	Level of Risk (A)	Seriousness of Potential Injury (B)	Risk/Injury Factor (A x B)	Recommended Personal Protective Equipment
Impact				
Potential of flying objects				
Chemical splash				
Chipping, hammering, etc.				
Torch cutting and brazing				
Welding				

Total Risk/Injury Factor _____

Summary of required PPE _____

Hand and Arm Hazards



Description of Hazards _____

Hazard Category	Level of Risk (A)	Seriousness of Potential Injury (B)	Risk/Injury Factor (A x B)	Recommended Personal Protective Equipment
Penetration				
Chemical				
Temperature				
Electrical shock				
Other				

Total Risk/Injury Factor _____

Summary of required PPE _____

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APPENDIX B: Hazard Analysis (Continued) 4

Foot and Leg Hazards



Description of Hazards _____

Hazard Category	Level of Risk (A)	Seriousness of Potential Injury (B)	Risk/Injury Factor (A x B)	Recommended Personal Protective Equipment
Impact				
Penetration (Puncture)				
Compression (Roller)				
Chemical				
Temperature				
Electrical shock				
Slippery conditions				
Other				

Total Risk/Injury Factor _____

Summary of required PPE _____

APPENDIX C: Eye and Face Protection Selective Chart

Quick Reference Protective Eye Wear Chart

North Carolina Department of Transportation Safety and Loss Control Division • If you have any questions, please discuss them with your safety engineer or call (919) 350-4300.

Inventory numbers		Safety glasses		Eyeshield molded universal		Welding goggles		Goggles		Headgear with visor		Welding helmet	
		35-06795		35-03785 (gray tint)		35-04173		35-04150 (regular)		35-04268 (without face shield)		35-04345 (with safety hat)	
		35-06790		35-03780 (clear)				35-04155 (hooded ventilation)		35-07130 (with face shield)		35-04330 (without safety hat)	
				35-03710 (clear overglasses)				35-04095 (clear clipper)					
				35-03712 (tinted overglasses)									
Impact		Heat		Chemical		Dust		Optical Radiation		Environmental Conditions		Environmental Conditions	
chipping, grinding, machining, sanding, riveting, doing masonry or chain saw work		furnace operations, pouring, casting, hotclipping, cutting, welding and handling gas		handling acid and chemicals, plating and degreasing		wood working, burning and in dusty conditions		gas welding, torch soldering, torch brazing, and electric arc welding					

APPENDIX D: Hand and Arm Protective Wear

Cut-Resistant

This type of glove is used where protection against cuts is required. Plastic dots can be adhered to the metal mesh to facilitate gripping. Another type of cut-resistant glove combines stainless steel with cut-resistant fiber wrapped with nylon fibers for enhanced flexibility and surface softness. These materials resist knives, glass, sheet metal, sharp edges, and other cutting surfaces. They are cut-resistant but not cut-proof or puncture proof. These materials must not be subjected to high speed knives or serrated blades.

High and Low Temperatures

Gloves, mittens, and arm and sleeve protectors are available in a wide variety of materials. Leather is a common welder's glove material. Heavy duty terrycloth gloves can provide heat protection of up to 350 degrees F. For extreme high and low temperature protection, specially processed silica fiber cloth (non-asbestos) can withstand temperatures of from -100°F to 1100°F. Do not use asbestos gloves.

Splinters, Cuts, Abrasion, and General Use

Light weight pigskin, goatskin, or calfskin leather gloves enable dexterity and grip while offering some resistance to cuts and abrasions. Other materials which offer similar protection include laminated nitrile coating on stretch fabric, vinyl, rubber coated, or impregnated fabrics.

Electrical Protection

Rubber devices that protect against electrical shock must meet the ANSI J6 series standards. Rubber insulating gloves must meet ANSI J6.6. These gloves are available to meet different voltage exposures. Light weight low voltage gloves are for use on voltages of under 1000V. Gloves for use on high voltage are of thicker material for the dielectric strength. As the voltage rating increases, so does the glove weight. Leather glove protectors are available to protect rubber gloves against punctures and abrasion. Employees who use this type of equipment must be qualified (see 29 CFR 1910.331 [a]). Rubber gloves must be visually inspected and an "air" test must be performed before they are used.

Repetitive Motion and Vibration

Protective gear is available to minimize repetitive hand and wrist motions. One glove has openings for the fingers but offers palm protection. These anti-vibration gloves may be worn under regular work gloves.

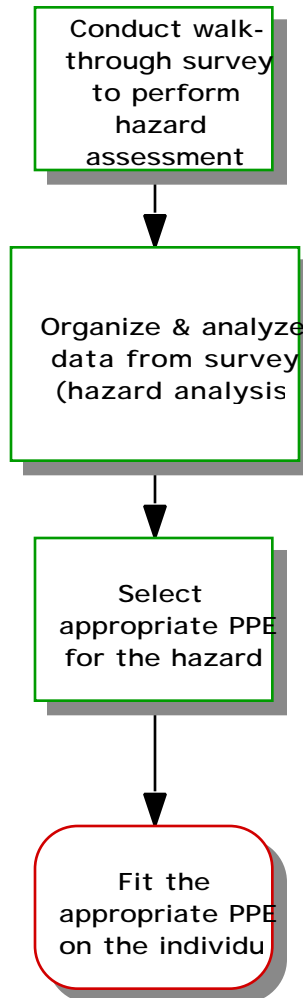
APPENDIX D: Hand and Arm Protective Wear (Continued) 2

Chemicals

Glove materials used to protect against chemicals include natural rubber, neoprene, polyvinyl chloride, polyvinyl alcohol, and nitrile. Chemical degradation guides are available to determine the general suitability of various glove materials to exposures of specific chemicals.

Many operational variables may affect the performance of chemical protection gloves, including chemical combinations and concentrations, temperature, and exposure time. Safety and Loss Control will assist Managers/Unit Heads and Supervisors in determining the suitability of the glove material for the job.

PPE Flowchart



Respiratory Protection

SPP# 1910.134

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for using respiratory protection to protect the health of North Carolina Department of Transportation (NCDOT) employees from airborne hazards.

2.0 Scope and Applicability

The human respiratory system is the quickest and most direct avenue of material entry into the human body. Toxic materials can enter the body through the lungs and present serious health risks.

This safety policy and procedure presents guidelines for the use of respiratory protection to protect NCDOT employees from airborne hazards. It includes provisions for training and discussion on the requirements for a written respirator program. Details are presented on the administration requirements of a respiratory protection program, the need for hazard assessments and respirator selection guidelines. Additionally, discussion is presented on recordkeeping, purchasing, and

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medical requirements associated with respiratory protection.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any employee who, as a result of his or her job duties, is exposed to air contaminants or hazardous environments where contaminants exceed the Permissible Exposure Limit (PEL) or are immediately dangerous to life and health.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.134) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.103).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT employees will use respirators when engineering and administrative controls are unable to reduce air contaminants below their PEL or failed to eliminate immediately conditions dangerous to life and health. When respiratory hazards exist that cannot be eliminated, safe work practices and additional employee training regarding Respiratory Protection will be implemented to reduce exposures below the PEL. These measures will be implemented to minimize those hazards in order to ensure the safety of employees.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Respiratory Protection. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Respiratory Protection.

6.1 Definitions

Aerosol

Particles, solid or liquid, suspended in air.

Airline Respirator

An atmosphere-supplying respirator in which the respirable gas is not designed to be carried by the wearer.

American Industrial Hygiene Association (AIHA)

Professional organization of industrial hygiene.

Approved

Evaluated and listed as permissible by NIOSH/MSHA, for the respirator's intended use.

Contaminant

A harmful, irritating, or nuisance airborne material.

Disposable Respirator

A respirator for which maintenance is not intended and that is designed to be discarded after excessive resistance, sorbent exhaustion, physical damage, or end-of-use-service-life renders it unsuitable for its intended use.

Dust

An aerosol consisting of mechanically produced solid particles derived from the breaking up of larger particles.

Exposure Limit

The maximum allowable concentration of a contaminant in the air to which an individual may be exposed. These may be time-weighted averages, excursion limits, ceiling limits and short-term limits.

Filter

A component used in respirators to remove solid or liquid aerosols from the inspired air.

Fit Check

A test conducted by the wearer to determine if the respirator is properly sealed to the face.

Fit Factor

A quantitative measure of the fit of a particular respirator to a particular individual.

Fit Test

The use of challenge agent to evaluate the fit of a respirator on an individual.

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Fume

Solid aerosols formed by the condensation of gas or vapor.

Hazardous Atmosphere

An atmosphere that contains a contaminant(s) in excess of the exposure limit or is oxygen deficient.

High-Efficiency Filter

A filter that removes from the air 99.97 percent or more of the aerosols having a diameter of 0.3 micrometers.

Immediately Dangerous to Life or Health (IDLH)

Any atmosphere that poses an immediate hazard to life or poses immediate irreversible debilitating effects on health.

Permissible Exposure Limit (PEL)

Regulatory limits for contaminants that include:

- Eight hour time weighted average (TWA)
- Short Term Exposure Limit (STEL)
- Ceiling (c)
- Excursion Limits.

Qualified Person

Safety Engineer who has training and experience in air monitoring, exposure assessment, and workplace evaluations under the direction of a Certified Industrial Hygienist (CIH). (A Certified Industrial Hygienist will meet these requirements.)

Workplace Exposure Evaluation

Air monitoring for contaminants in the workplace that is performed by a qualified person (Safety Engineer, Industrial Hygienist, etc.).

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Written Respirator Program
- Administration
- Hazard Assessment
- Respirator Selection
- Recordkeeping
- Purchasing
- Medical

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6.2.1 Training

Employees who use or who are assigned respirators shall be trained in :

- Respirator limitations under various conditions
- Protection factors of the various types of respirators
- Proper use, maintenance, cleaning, disinfection, and storage of respirators
- Fit testing of the respirator face seal

This training shall be provided upon initial job assignments requiring the use of respirators. Retraining shall be provided when job conditions change. Periodic refresher training shall be provided at the discretion of the supervisor. Fit testing of respirators shall be conducted at least annually.

6.2.2 Written Respirator Program

This safety policy and procedure provides an overview of the key components of respiratory protection. The specifics of respiratory protection are included in NCDOT's Respiratory Protection Program administered by the Manager of Safety and Loss Control. The key elements of this written respirator program are:

- Using standard operating procedures for respirator training, selection, use, maintenance, storage, procurement, and medical examinations
- Selecting respirators based upon employee exposure hazards
- Training respirator users on the proper use and limitations of respirators
- Assigning respirators to individual workers for their exclusive use
- Cleaning and disinfecting respirators on a regular basis
- Storing respirators in convenient, clean and sanitary locations
- Inspecting respirators during routine cleaning for worn or damaged parts
- Conducting surveillance of work area conditions and degrees of employee exposure or stress
- Conducting regular inspections and evaluations to determine the continued effectiveness of the program
- Not assigning respirators until it has been determined that the employee is physically able to perform the work and use the equipment

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6.2.3 Administration

Administration of the respiratory program may be delegated to the Division Safety Engineers. They may assist in the implementation of the respirator program, selection of approved respirators, training and record-keeping.

6.2.4 Hazard Assessment

A qualified person shall assess employee exposures to airborne contaminants prior to the employee using a respirator. Based on the assessment, the proper respirator shall be selected to control the exposure. Exposure assessments shall be based on air monitoring data, process information, work environment, historical data, and work practices relative to the type of contaminant.

The PEL of an air contaminant does not have to be exceeded for an employee to use a respirator. The employee may request the use of a respirator because of a nuisance exposure or for personal reasons. These circumstances should be evaluated and respirator use approved if the circumstances favor the use of a respirator.

6.2.5. Respirator Selection

The types of respirators used in NCDOT are:

- Disposable or single use type
- Negative pressure air purifying
- Powered air purifying respirator (PAPR)
- Air-line
- Self-contained breathing apparatus (SCBA)

Figures 1,2,3,4, and 5 illustrate examples of disposable, negative pressure air purifying, PAPRs, airline, and SCBA respirators respectively.

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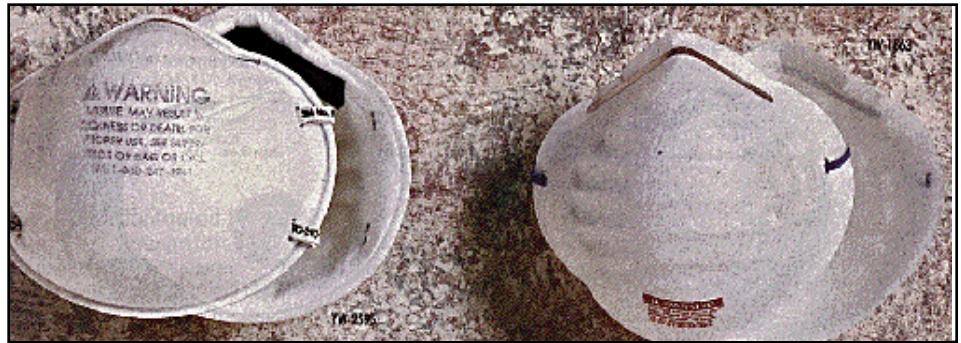


Figure 1



Figure 2



Figure 3



Figure 4



Figure 5

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The types of cartridges used on air purifying respirators are:

- Dust, particulate - welding, cutting, nuisance dust
- HEPA - asbestos and radionuclides; lead; silica
- Organic - solvent vapors
- Acid gas - hydrogen sulfide, chlorine, sulfur dioxide

Only Mine Safety Health Administration (MSHA)/ National Institute of Occupational Safety and Health (NIOSH) approved type respirators shall be used by NCDOT to protect employees from airborne contaminants. The respirators shall be selected to provide the protection factor to achieve compliance with a PEL for the particular airborne contaminant(s).

6.2.7 Recordkeeping

Records shall be kept on each employee who receives training and fit testing. This record will include the name, SSN, location of respirator use, type of contaminant(s), respirator type, tester, medical evaluation and results of fit testing. See Appendix A for the form.

6.2.8 Purchasing

Only approved type respirators shall be purchased and kept in stock along with an adequate supply of cartridges and replacement parts. Respirator evaluation and approval forms shall be forwarded to the Central Equipment Unit from Safety and Loss Control. Unapproved respirators shall be removed from inventory control.

6.2.9 Medical

All employees who are candidates for a respirator shall receive a medical examination by a licensed physician. A work and personal history form shall be provided to the physician at the time of examination (see Appendix B). The physician will determine if the employee is capable of wearing the selected respirator (see Appendix C). No employees will wear a respirator until a medical exam and fit testing are completed.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of respiratory protection equipment and related supplies. They will also be responsible for identifying the employees affected by this safety policy and procedure and that those employees are provided a medical examination before being issued a respirator. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

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Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training or medical evaluation to perform any of the tasks or activities requiring respiratory protection. They will also ensure that respirators are properly worn and maintained.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads.

Supervisors will be responsible for ensuring that an adequate supply of respirators, cartridges, and replacement parts are available.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure. They will maintain and clean the respirator assigned to them and properly store the respirator when not in use.

6.3.4 Qualified Persons

Qualified persons shall be responsible for conducting air monitoring where there is suspicion of air contamination. They shall perform exposure assessments, workplace evaluation, and recommend exposure controls.

6.3.5 Administrator

This individual will be responsible for implementing the respirator program, selecting approved respirators, training and recordkeeping.

6.3.6 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety and Loss Control will develop a comprehensive written respirator program and provide assistance to managers/unit heads and supervisors on respirator fit testing, program review, and training. They will update and modify the written program and submit a list of approved respirators to the Central Equipment Unit. Safety and Loss Control will also maintain a quality assurance program for respiratory protection through field evaluations.

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The Industrial Hygienist will provide training, expertise, and guidance to the qualified person on air monitoring, exposure control, and risk assessment strategies. Air monitoring data as applicable, will be evaluated by Safety and Loss Control's Industrial Hygienist for completeness, accuracy, and precision.

Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased respirators and supplies comply with current safety regulations and this safety policy and procedure.

Safety Engineers and the Industrial Hygienist will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.7 Central Equipment Unit

Central Equipment Unit will maintain an inventory of approved respirators for NCDOT use.

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APPENDIX A: NCDOT Respirator Documentation Form

Name: _____ SSN: _____
Division: _____ District: _____ County: _____
Unit: _____ Job Title: _____
Name of Immediate Supervisor: _____

Air Contaminant: _____

Respirator Type (Check all that apply)

Air purifying non-powered:

- ☐ Disposable
- ☐ Permanent
- ☐ Half-face
- ☐ Full-face

Air purifying powered:

- ☐ Half-face
- ☐ Full-face
- ☐ Hood

Atmosphere-supplying respirator

- ☐ Half-face
- ☐ Full-face
- ☐ Hood
- ☐ Supplied air
- ☐ Combined airline/SCBA
- ☐ Open circuit SCBA
- ☐ Closed circuit SCBA
- ☐ Continuous flow

Work Effort Level

- ☐ Light
- ☐ Moderate
- ☐ Heavy
- ☐ Strenuous

Frequency of Use

- ☐ Daily
- ☐ Occasional - more than once per week
- ☐ Rarely
- ☐ Rescue

Length of use when worn: _____ Hours

Work Conditions

- ☐ Outside
- ☐ Inside
- ☐ Confined Space

Special Work Conditions

- ☐ High Temperature
- ☐ High Humidity
- ☐ Cold
- ☐ Protective Clothing
- ☐ Heights

Comments: _____

Signature of SE/SO/Supervisor _____

Title _____

To Be Completed By a Safety Engineer, Safety Officer, or Supervisor

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APPENDIX B: NCDOT Pre-Evaluation Medical Questionnaire

Name: _____ SSN: _____
DOB: _____ Age: _____ Weight: _____ Height: ____feet ____inches

Have you ever had or do you now have any of the following?

Yes No Don't Know

- | | | | |
|--------------------------|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Lung Disease |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Persistent cough |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Heart disease |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Shortness of breath |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | History of fainting or seizures |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | High blood pressure |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Diabetes |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Fear of close/tight places |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Smothering sensation |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Heat stroke or heat exhaustion |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Ruptured ear drum |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Defective hearing |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Wear corrective lenses |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Other problems with your eyes |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Do you smoke |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Any other condition that might interfere with the use of a respirator or limit your ability to work |

If yes, explain: _____

List any medications that you are presently taking: _____

Employee Signature

Date

To Be Completed and Presented To The Physician By The Employee

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APPENDIX C: Physician's Respirator Use Evaluation Form

Physician's Evaluation

Employee's Name: _____

Employee's SSN: _____

EVALUATION:

1. **NO RESTRICTIONS** on respirator use
2. **RESTRICTIVE USE**
3. **NOT APPROVED** to use a respirator

Restrictions or comments:

Examining Physician's Signature _____

_____ Date

To Be Completed By The Examining Physician

Hand and Portable Power Tools**SPP # 1910.241****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and accountability for hand and portable power tools used by North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Hand and power tools improve employee efficiency in job performance. The safety objective with these tools is to protect users from inflicting harm on themselves and others. Although it is generally assumed that anyone knows how to use common hand tools, hand tool accidents contribute significantly to NCDOT's compensable disabling injuries. Proper selection, use, care, and supervision of hand and portable power tools can prevent abuse of these tools and eliminate or reduce employee injuries.

This safety policy and procedure provides guidelines for the use of hand and portable power tools. It includes provisions for training and lists the general requirements for all tools. Additionally, it presents specifics on hand tool use, types of portable power tools, and the hazard controls for portable power tools. This document also provides the general requirements for Personal Protective Equipment and tools storage.

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This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT and applies to all NCDOT employees who work with hand and portable power tools.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.241-244) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.300-305).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, hand and portable power tools will not be used until employees receive training in the proper use of these tools. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Hand and Portable Power Tools will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Hand and Portable Power Tools. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities.

6.1 Definitions

Hand Tools

Tools that are manually operated and powered by human force such as screw drivers, pliers, wrenches, and cutting shears, etc.

Pneumatic Tools

Tools that are powered by air such as air wrenches, air grinders, spray guns, and air fasteners.

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Power Tools

Tools that are manually operated and powered by electricity, air, gasoline, diesel, or explosives.

UL Approved

Tools approved by Underwriters' Laboratory.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- General Requirements for All Tools
- Use of Hand Tools
- Portable Power Tools
- Personal Protective Equipment
- Storage

6.2.1 Training

An effective tool use program should include training in safe work practices to reduce tool injuries and control accidents. For hand tools, employees should be trained in:

- Selecting the right tool for the job
- Knowing the hazards of the tool
- Using tools correctly
- Having a regular tool inspection procedure
- Maintaining tools
- Storing tools properly

Employees who use portable power tools shall be trained in:

- Selecting the right tool for the job
- Knowing the hazards of the tool
- Disconnecting the power before changing accessories
- Following manufacturer's operating and inspection rules
- Having guards in place
- Maintaining tools
- Storing tools properly

This training shall be performed upon initial employment and/or job reassignment. Periodic refresher training shall also be conducted at the discretion of the supervisor.

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6.2.2 General Requirements for All Tools

All hand and portable power tools supplied by NCDOT or employees of NCDOT will be maintained in safe working order.

Hand tools shall be inspected regularly and before using. Tools or handles that are cracked, broken, or deformed shall be removed from service. Impact tools such as wedges, pins, and chisels shall be kept free of mushroomed heads.

Portable power tools shall be inspected regularly and before using. Tools with missing or broken guards, nicked or frayed electrical cords, broken plugs, broken switches, damaged equipment housing, or missing or broken tool retainer shall not be used and shall be tagged and removed from service.

6.2.3 Use of Hand Tools

Figure 1 illustrates some of the many hand tools that are used in NCDOT. Misuse of common hand tools such as screwdrivers, hammers, punches, cutting tools, tap and die tools, saws, files, hands snips and cutters, wood chisels, axes, hatchets, knives, shovels, and rakes is a source of many injuries. Supervisors may mistakenly assume that everyone knows the proper use of common hand tools.

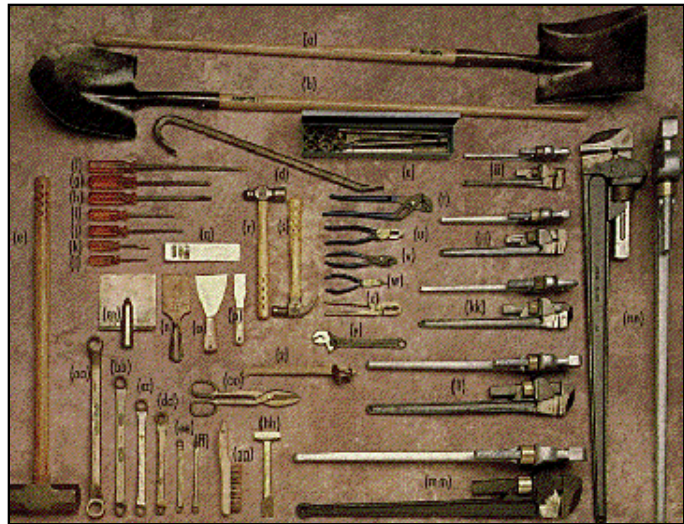


Figure 1

Appendix A presents specific **safe work practices** for hand tools in the following major hand tool categories:

- Metal-Cutting Hand Tools
- Wood-Cutting Tools
- Miscellaneous Cutting Tools
- Torsion Tools
- Shock Tools
- Spark-Resistant Tools

Tool safeguards are generally accomplished through a number of safety features found on tools. Safety features such as toolguards and handle design can help prevent injuries.

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Figure 2 presents a handle design tool safeguard feature.

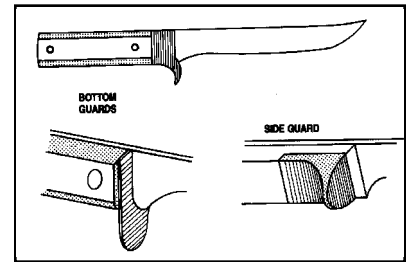


Figure 2

6.2.4 Types of Portable Power Tools

Portable power tools are divided into 3 primary groups according to the power source:

- Electrical
- Air-Powered
- Special Powered

Electrical tools in NCDOT include drills, circular saws, reciprocating saws, miter-box and shop saws, stationary band saws, jig/saber saws, rotary die grinders, soldering irons, percussion tools, grinding wheels, buffers, wire brushes, sanders, and routers. Employees must recognize and protect themselves from shock, noise, cuts, burns, and other potential hazards by using proper guards and safety equipment and devices.

Air-powered tools include air hoses, grinders, and pneumatic-impact tools. Workers should ensure hoses do not present tripping hazards, avoid using hoses as cleaners, and prevent accidental disconnection of hoses from the tools. Air-powered grinders require the same type of guarding as electrical grinders.

Pneumatic-impact tools (nailers, drills, impact wrenches, staplers, jackhammers, etc.) require two safety devices: an automatically closing valve and a retaining device to hold the tool in place to prevent it from being fired accidentally. Additionally, employees must check noise levels to determine if hearing protection is needed and guard their eyes against flying debris.

Special powered tools include hydraulic, gasoline-powered, and powder-actuated equipment. Hydraulic tools cause injuries because high pressure leaks or ruptures in hoses may force oil under the skin of employees' hands or arms.

Gasoline-powered tools are commonly used in logging and construction activities. The chain saw is a common gasoline-powered tool in NCDOT. Mowers, trimmers, and other various gasoline-powered tools are also used in NCDOT.

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Powder-actuated tools are commonly used for fastening fixtures and materials to metal, precast or prestressed concrete, masonry block, brick, stone, and wood surfaces. Blank cartridges provide the energy and are ignited by a percussion primer.

Gasoline-powered and powder-actuated tools present serious hazards and must be operated only by trained personnel and adequately guarded to prevent fires and injuries. Similar precautions are used for impact wrenches as for any electrical or hydraulic equipment.

6.2.5 Hazard Controls for Portable Power Tools

Portable power tools are designed for particular tasks and if used for other purposes other hazards may be created. Additionally, the extreme mobility of these tools and their power sources creates significant hazards.

Therefore, controls should be in place to minimize or eliminate the hazards associated with portable power tools. The commonly used controls on portable power tools include:

- Start switch lockouts
- Interlocks
- Dead man switches
- Vibration minimization (as applicable)
- Tool guards
- Safeguarding energy sources

Start switch lockouts prevent inadvertent operation. A tool cannot operate until a keyed switch selects the operating mode.

Interlocks on tools protect operators and others. For example, a riding mower has a switch under the operator's seat that shuts off the blades or engine when the operator stands up.

Dead man switches shut off power to the tool when the switch is released. Drills, saws, mowers, hedge trimmers, and other portable power tools have these controls.

Vibration minimization is usually a tool design function. If extreme vibration of the tool is a problem to the employee, using isolation pads within the machine or between the handles and operator may be an option.

Tool guards should be provided where possible. Tools such as circular saws, belt sanders, and abrasive wheel grinders should be equipped with guards that effectively prevent the hands and fingers of the operator from coming into contact with blades and nip points.

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Guarding may not be possible on some equipment such as chain saws. In those cases, other safety features should be in place (e.g., blade brake, anti-kickback design, etc.).

Safeguarding energy sources must be practiced with all the power tools. Electrical safeguards, controls for handling gasoline and other flammable liquids, and controls for air and fluids under pressure must all be in place.

Appendix B details selected portable power tools safe practices. These practices include hazard control techniques and should be followed by employees who use these types of tools.

6.2.6 Personal Protective Equipment

Employees using hand and power tools are to be provided with Personal Protective Equipment (PPE) when exposed to falling, flying, abrasive and splashing objects, or harmful dusts, fumes, vapors, or gases.

The PPE should be matched against the particular hazard to provide the required level of protection. See [SPP # 1910.132, Personal Protective Equipment](#), for details on matching PPE against the particular hazard.

6.2.7 Storage

Hand and portable power tools shall be stored on racks, tool cribs, or bins. Tools shall be stored in such a manner that sharp edges do not protrude out of tool cribs or bins or damage other tools. Each day, tool storage areas should be locked with a complete audit of all tools.

Special tools may require unusual storage. See manufacturer's instructions for those requirements. For example, powder-actuated hand tools should be stored under lock and key.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will identify the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

Managers/Unit Heads will ensure that hand and portable power tools are being inspected by supervisors.

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6.3.2 Supervisors

Supervisors will ensure that only trained employees operate and use hand and portable power tools.

Supervisors will inspect hand and portable power tools during Facility and Jobsite Audits as well as observe the storage and use of such tools by employees.

Supervisors will enforce the use of PPE while employees operate hand and portable power tools.

Supervisors will ensure that guards and switches on portable power tools are in place and functioning.

Supervisors will ensure that portable power tools are used and maintained in accordance with this safety policy and procedure.

Supervisors will communicate to managers/unit heads hand and portable power tool needs such as storage facilities and bins, upgrading, replacement parts, and new tools.

6.3.3 Employees

Employees shall inspect all tools prior to their use and shall report any broken or damaged tools to their supervisors.

Employees shall not operate any hand and portable power tool unless they have been trained on that specific tool.

Employees shall wear all required PPE when using tools.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased hand and portable power tools comply with this safety policy and procedure and current safety regulations.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit shall ensure that the required guards, switches, and warning labels are specified during equipment purchases.

APPENDIX A: Selected Hand Tools Safe Work Practices

Metal-Cutting Hand Tools

Chisels

Factors determining the selection of a cold chisel are the materials to be cut, the size and shape of the tool, and the depth of the cut to be made.

The chisel should be made heavy enough so that it will not buckle or spring when struck.

A chisel large enough only for the job should be selected so that the blade is used rather than the point or corner. Also, a hammer heavy enough to do the job should be used.

Employees shall wear safety goggles when using a chisel and should set up a shield or screen to prevent injury to other workers from flying chips. If a shield does not afford positive protection to all exposed employees, then glasses with side protection should be worn.

Tap and Die Work

Tap and die work requires certain precautions. The work should be firmly mounted in the vise. Only a T-handle wrench or adjustable tap wrench should be used. When threads are being cut with a hand die, hands and arms should be kept clear of the sharp threads coming through the die and metal cuttings should be cleared away with a brush.

Hack Saws

Hack saws should be adjusted in the frame to prevent buckling and breaking, but should not be tight enough to break off the pins that support the blade. Install blade with teeth pointing forward.

Pressure should be applied on the forward stroke not on the back stroke. If the blade is twisted or too much pressure is applied, the blade may break and cause injury to the hands or arms of the user.

Files

Selection of the right kind of file for the job will prevent injuries and lengthen the life of the file. Inasmuch as the extremely hard and brittle steel of the file chips easily, the file should never be cleaned by being struck against a vise or other metal object. A file-cleaning card or brush should be used.

For the same reason, a file is not to be hammered or used as a pry. Such abuse frequently results in the file's chipping or breaking causing injury to the user. A file should not be made into a center punch, chisel, or any other type of tool because the hardened steel may fracture in use.

APPENDIX A: Selected Hand Tools Safe Work Practices (Continued) 2

A file is never to be used without a smooth, crack-free handle; if the file should bind, the tang may puncture the palm of the hand, the wrist, or other part of the body. Under some conditions, a clamp-on raised offset handle may be useful to give extra clearance for the hands. Files are not to be used on lathe stock turning at high speed (faster than 3 turns per file stroke) because the end of the file may strike the chuck, dog, or face plate and throw the file (or metal chip) back at the operator hard enough to inflict serious injury.

Tin Snips

Tin snips should be heavy enough to cut the material so easily that the worker needs only one hand on the snips and can use the other to hold the material. The material is to be well supported before the last cut is made so that cut edges do not press against the hands.

Jaws of snips are to be kept tight and well lubricated.

Employees shall wear safety goggles when trimming corners or slivers of metal because small particles often fly with considerable force. They shall always wear gloves.

Cutters

Cutters used on wire, reinforcing rods, or bolts should have ample capacity for the stock; otherwise, the jaws may be sprung or spread. Also, a chip may fly from the cutting edge and injure the user.

Cutters require frequent lubrication. To keep cutting edges from becoming nicked or chipped, cutters are not to be used as nail pullers or pry bars.

Cutter jaws should have the hardness specified by the manufacturer for the particular kind of material to be cut. By adjustment of the bumper stop behind the jaws, cutting edges are to be set to have a clearance of 0.003 inch when closed.

Wood-Cutting Tools

Edge tools are to be used so that if a slip should occur the direction of force will be away from the body. For efficient and safe work, edge tools are to be kept sharp and ground to the proper angle. A dull tool does a poor job and may stick or bind.

Wood Chisels

Inexperienced employees shall be instructed in the proper method of holding and using chisels. Handles are to be free of splinters.

The wood handle of a chisel struck by a mallet is to be protected by a metal or leather cap to prevent it from splitting.

APPENDIX A: Selected Hand Tools Safe Work Practices (continued) 3

The work to be cut must be free of nails to avoid damage to the blade or cause a chip to fly into the user's face or eye.

Saws

Saws should be carefully selected for the work they are to do. For crosscut work on green wood, a coarse saw (4 to 5 points per inch) is to be used. A fine saw is better for smooth, accurate cutting in dry wood. Saws are to be kept sharp and well set to prevent binding.

Axes

An ax person is to make sure that there is a clear circle in which to swing the ax before starting to chop. Also, all vines, brush, and shrubbery within the range should be removed, especially overhead vines that may catch or deflect the ax.

Ax blades shall be protected with a sheath or metal guard wherever possible. When the blade cannot be guarded, it is safer to carry the ax at one's side. The blade on a single-edged ax shall be pointed down.

Hatchets

Hatchets shall not be used for striking hard metal surfaces, since the tempered head may injure the user or others by flying chips. When using a hatchet in a crowded area, employees shall take special care to prevent injury to themselves and other workers. Using a hatchet to drive nails is prohibited.

Miscellaneous Cutting Tools

Planes, Scrapers, Bits, and Drawknives

Planes, scrapers, bits, and drawknives are to be used only by experienced employees. These tools are to be kept sharp and in good condition.

The principal hazard in the use of knives is that the hands may slip from the handle onto the blade or that the knife may strike the body or the free hand. A handle guard or a finger ring (and swivel) on the handle eliminates these hazards. Adequate guarding is important.

Employees who must carry knives with them on the job shall keep them in sheaths or holders. Never carry a sheath knife on the front part of a belt - always carry it over the right or left hip, toward the back. This will prevent severing a leg artery or vein in case of a fall.

Knives must never be left lying on benches or in other places where they may cause hand injuries. Safe placement and storage of knives is important to knife safety.

APPENDIX A: Selected Hand Tools Safe Work Practices (continued) 4

Supervisors must ensure that employees who handle knives have ample room in which to work so they are not in danger of being bumped by other workers.

Supervisors should be particularly careful about the hazard of employees leaving knives hidden under a product, under scrap paper or wiping rags, or among other tools in work boxes or drawers. Knives are to be kept separate from other tools to protect the cutting edge of the knife as well as to protect the employee.

Horseplay shall be prohibited around knife operations. Throwing, "fencing," trying to cut objects into smaller and smaller pieces, and similar practices are not only dangerous but reflect inadequate supervision.

Supervisors shall ensure that nothing is cut that requires excessive pressure on the knife. Knives shall not be used as a substitute for can openers, screwdrivers, or ice picks.

Torsion Tools

Socket wrenches are safer to use than adjustable or open-end wrenches.

Open-End or Box Wrenches

Open-end or box wrenches shall be inspected to make sure that they fit properly and are never to be used if jaws are sprung or cracked. When defective they shall be taken out of service until repaired.

Socket Wrenches

Socket wrenches give great flexibility in hard-to-reach places. The use of special types shall be encouraged where there is danger of injury.

Adjustable Wrenches

Adjustable wrenches are used for many purposes. They are not intended, however, to take the place of standard open-end, box or socket wrenches. They are used mainly for nuts and bolts that do not fit a standard wrench. Pressure is always applied to the fixed jaw.

Pipe Wrenches

Pipe wrenches, both straight and chain tong, shall have sharp jaws and be kept clean to prevent slipping.

The adjusting nut of the wrench is to be inspected frequently. If it is cracked, the wrench shall be taken out of service. A cracked nut may break under strain, causing complete failure of the wrench and possible injury to the user.

APPENDIX A: Selected Hand Tools Safe Work Practices (Continued) 5

A piece of pipe "cheater" slipped over the handle shall not be used to give added leverage because this can strain a pipe wrench to the breaking point. The handle of every wrench is designed to be long enough for the maximum allowable safe pressure.

A pipe wrench should never be used on nuts or bolts, the corners of which will break the teeth of the wrench, making it unsafe to use on pipe and fittings. Also, a pipe wrench, when used on nuts and bolts, damages their heads. A pipe wrench shall not be used on valves, struck with a hammer, nor used as a hammer.

Pliers

Side-cutting pliers sometimes cause injuries when short ends of wires are cut. A guard over the cutting edge and the use of safety glasses will help prevent eye injuries.

The handles of electricians' pliers are to be insulated. In addition, the electricians shall wear the proper electrical rated gloves if they are to work on energized lines.

Pliers shall not be used as a substitute for a wrench.

Special Cutters

Special cutters include those for cutting banding wire and strap. Claw hammers and pry bars shall not be used to snap metal banding material.

Pipe Tongs

Employees must neither stand nor jump on the tongs nor place extensions on the handles to obtain more leverage. They should use larger tongs.

Screwdrivers

The practice of using screwdrivers for punches, wedges, pinch bars, or pries shall not be allowed.

Cross-slot (Phillips-head) screwdrivers are safer than the square bit type, because they have less tendency to slip. The tip must be kept clean and sharp, however, to permit a good grip on the head of the screw.

The part to be worked upon must never be held in the hands; it should be laid on a bench or flat surface or held in a vise.

No screwdriver used for electrical work shall have the blade or rivet extending through the handle. Both blade and handle shall be insulated except at the tip.

APPENDIX A: Selected Hand Tools Safe Work Practices (Continued) 6

Shock Tools

Hammers

A hammer is to have a securely wedged handle suited to the type of head used. The handle shall be smooth, without cracks or splinters, free of oil, shaped to fit the hand, and of the specified size and length.

Employees shall be warned against using a steel hammer on hardened steel surfaces. Instead, a soft-head hammer or one with a plastic, wood, or rawhide head should be used. Safety goggles or safety glasses shall be worn to protect against flying chips, nails, or scale.

Riveting Hammers

Riveting hammers, often used by sheet metal workers, must have the same kind of use and care as ball pen hammers and should be watched closely for cracked or chipped faces.

Carpenter's or Claw Hammers

The faces shall be kept well dressed at all times to reduce the hazard of flying nails while they are being started into a piece of wood. A checker-faced head is sometimes used to reduce this hazard.

Eye protection is advisable for all nailers and all employees working in the same area.

Spark-Resistant Tools

Spark-resistant tools of nonferrous materials are sometimes advised for use where flammable gases, highly volatile liquids, and explosive materials are stored or used. The intensified sparks from steel tools are capable of igniting substances such as gunpowder, lint, TNT, carbon disulfide, and ethyl ether.

In certain circumstances, steel coated with aluminum paint can emit sparks when struck with a metal striker (steel, brass, or spark-resistant alloys) and such sparks may ignite mixtures of flammable gases or vapors in air.

Nonferrous tools reduce the hazard from sparking but do not eliminate it. They must be inspected before each use to be certain that they have not picked up foreign particles which could produce friction sparks.

APPENDIX B: Portable Power Equipment Safe Work Practices

Electric Tools

- Insulating platforms, rubber mats, and rubber gloves provide an additional factor of safety when tools are used in wet locations, such as in tanks, in boilers, and on floors.
- Only tools in good repair and listed by Underwriters' Laboratories shall be used.
- Protection from electric shock while using portable power tools has been described as depending upon third wire protective grounding. "Double insulated" tools provide more reliable shock protection without third wire grounding. Tools in this category are permanently marked by the words "double insulation" or "double insulated."

Double insulated or all-insulated tools do not require separate ground connections; the third wire or ground wire is to be used wherever it is supplied as indicated to be part of the tool's electrical connection.

Failure of insulation is harder to detect than worn or broken external wiring. This illustrates the need for frequent inspection and thorough maintenance. Care in handling the tool and frequent cleaning will help prevent the wear and tear that cause defects.

Double insulated tools shall not be operated on wet surfaces.

- All electric power tools shall be effectively grounded except the double insulated and cordless types.
- Electric cords shall be inspected periodically and kept in good condition. Heavy-duty plugs that clamp to the cord should be used to prevent strain on the current-carrying parts if the cord is accidentally pulled.
- Although no guards are available for drill bits, some protection is afforded if drill bits are carefully chosen for the work to be done, such as being no longer than necessary to do the work.
- Electric saws are usually well guarded by the manufacturer, but employees must be trained to use the guard as intended. The guard should be checked frequently to be sure that it operates freely and encloses the teeth completely when it is not cutting and encloses the unused portion of the blade when it is cutting.
- Circular saws shall not be jammed or crowded into the work. The saw is to be started and stopped outside the work.

APPENDIX B: Portable Power Equipment Safe Work Practices (Continued) 2

Abrasive Wheels and Tools

- All grinding machines shall be supplied with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operation.
- Grinding machines must be equipped with safety guards in conformance with the requirements of American National Standards Institute, B7.1, Safety Code, for the use, care, and protection of abrasive wheels.
- Floor-stand and bench-mounted abrasive wheels, used for external grinding shall be provided with safety guards (protection hoods). The maximum regular exposure of the grinding wheel periphery and sides shall be not more than 90 degrees except that when work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure shall not exceed 125 degrees.
- Floor and bench-mounted grinders shall be provided with work rests which are rigidly supported and readily adjustable. Such work rests shall be kept at a distance not to exceed 1/8 inch from the surface of the wheel.
- Cup-type wheels used for external grinding shall be protected by either a revolving-cup guard or a band-type guard. All other portable abrasive wheels used for external grinding shall be provided with safety guards (protection hoods), except as follows:
 - When the work location makes it impossible, a wheel equipped with safety flanges shall be used
 - When wheels 2 inches or less in diameter which are securely mounted on the end of a steel mandrel are used
- Portable abrasive wheels used for internal grinding shall be provided with safety flanges (protection flanges) except as follows:
 - When wheels 2 inches or less in diameter which are securely mounted on the end of a steel mandrel are used
 - If the wheel is entirely within the work being ground while in use
- When safety guards are required, they shall be so mounted as to maintain proper alignment with the wheel, and the guard and its fastenings shall be of sufficient strength to retain fragments of the wheel in case of accidental breakage. The maximum angular exposure of the grinding wheel periphery and sides shall not exceed 180 degrees.

APPENDIX B: Portable Power Equipment Safe Work Practices (Continued) 3

- When safety flanges are required, they shall be used only with wheels designed to fit the flanges. Only safety flanges, of a type and design and properly assembled so as to ensure that the pieces of the wheel will be retained in case of accidental breakage, shall be used.
- All abrasive wheels shall be closely inspected and ring-tested before mounting to ensure that they are free from cracks and defects.
- Grinding wheels shall fit freely on the spindle and shall not be forced into place. The spindle nut shall be tightened only enough to hold the wheel in place.
- All employees using abrasive wheels shall be protected by eye protection equipment.

Pneumatic Power Tools

- The operating trigger on portable hand-operated utilization equipment shall be so located as to minimize the possibility of its accidental operation and shall be arranged to close the air inlet valve automatically when the pressure of the operator's hand is removed.
- Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tools from becoming accidentally disconnected.
- Safety clips or retainers shall be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.
- All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 p.s.i. pressure at the tool shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.
- Compressed air shall not be used for cleaning purposes except with an air blow gun limited to 30 p.s.i. static pressure at the outlet nozzle and then only with effective chip guard and PPE.
- The manufacturer's safe operating pressure for hoses, pipes, valves, filters, and other fittings shall not be exceeded.
- The use of hoses for hoisting or lowering tools shall not be permitted.
- All hoses exceeding 1/2 inch inside diameter shall have a safety device at the source of supply or line to reduce pressure in case of hose failure.
- Airless spray guns of the type which atomize paints and fluids at high pressures (1,000 pounds or more per square inch) shall be equipped with automatic or visible manual safety devices which will prevent pulling of the trigger to prevent release of the paint or fluid until the safety device is manually released.

APPENDIX B: Portable Power Equipment Safe Work Practices (Continued) 4

- In lieu of the above, a diffuser net which will prevent high pressure, high velocity release, while the nozzle tip is removed, plus a nozzle tip guard which will prevent the tip from coming into contact with the operator, or other equivalent protection shall be provided.

Gasoline-Powered Tools

- All gasoline-powered tools shall be stopped while being refueled, serviced, or maintained, and fuel shall be transported, handled, and stored in approved safety cans. All cans shall be properly labeled.
- Leakage or spillage of flammable or combustible liquids shall be disposed of promptly and safely.
- When gasoline-powered tools are used in enclosed spaces, the applicable requirement for concentrations of toxic gases and use of PPE shall apply.

Hydraulic-Powered Tools

- The fluid used in hydraulic-powered tools shall be fire-resistant and shall retain its operating characteristics at the most extreme temperatures to which it will be exposed.
- The manufacturer's safe operating pressures for hoses, valves, pipes, filters, and other fittings shall not be exceeded.

Powdered-Actuated Tools

- Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool.
- The tool shall be tested each day before loading to see that safety devices are in proper working condition. The method of testing shall be in accordance with the manufacturer's recommended procedure.
- Any tool found not in proper working order or one that has developed a defect during use shall be removed from service immediately and not used until properly repaired.
- Adequate eye, head, face, and/or PPE as necessitated by working conditions shall be utilized by the operators and persons working in the area.
- The tool shall be designed so that it cannot be fired unless it is equipped with a standard protective shield or guard or a special shield, guard, fixture, or jib.
- The firing mechanism shall be designed so that the tool cannot fire during loading or preparation to fire or if the tool is dropped while loaded.

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APPENDIX B: Portable Power Equipment Safe Work Practices (Continued) 5

- Firing of the tools shall be dependent upon at least two separate and distinct operations of the operator, with the final firing movement being separate from the operation of bringing the tool into the firing position.
- The tool shall be designed so as not to be operable other than against a work surface and unless the operator is holding the tool against the work surface with a force at least five pounds greater than the weight of the tool.
- The tool shall be designed so that it will not operate when equipped with the standard guard indexed to the center position if any bearing surface of the guard is tilted more than eight degrees from contact with the work surface.
- The tool shall be designed so that positive means of varying the power are available or can be made available to the operator as part of the tool or as an auxiliary to facilitate selection of a power level adequate to perform the desired work without excessive force.
- The tool shall be designed so that all breeching parts will be reasonably visible to allow a check for any foreign matter that may be present.
- Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any employees. Hands shall be kept clear of the open barrel end.
- Loaded tools shall not be left unattended.
- Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile.
- Driving into materials easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.
- No fastener shall be driven into a spalled area caused by an unsatisfactory fastening.
- Power-assisted, hammer-driven tools are used for the same purposes as powder-actuated tools and generally the same precautions are to be followed.

Woodworking Tools

- All employees using woodworking tools shall be protected by eye protection equipment.
- All portable, power-driven circular saws shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for beveled cuts. The lower guard

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APPENDIX B: Portable Power Equipment Safe Work Practices (Continued) 6

shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to the covering position.

- All "fixed" power driven woodworking tools shall be provided with a disconnect switch that can either be locked or tagged in the "off" position.
- Automatic feeding devices shall be installed on machines whenever the nature of the work will permit. Feeder attachments shall have the feed rolls or other moving parts covered or guarded so as to protect the operator from hazardous points.
- The operating speed shall be etched or otherwise permanently marked on all circular saws over 20 inches in diameter or operating at over 10,000 peripheral feet per minute. Any saw so marked shall not be operated at a speed other than that marked on the blade.

Air Contaminants

SPP# 1910.1000

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines to protect the health of North Carolina Department of Transportation (NCDOT) employees from hazards due to the inhalation of airborne contaminants (e.g., gases, fumes, mists, vapors, particulates).

2.0 Scope and Applicability

An air contaminant is any substance which is accidentally or unwillingly introduced into the air, having the effect of rendering the air toxic or harmful to some degree. Through inhalation, airborne dust, fumes, vapors, mists, and gases may all be taken into the body. These contaminants can irritate the skin, eyes, nose, throat, and lungs, or they may also be absorbed into the bloodstream therefore affecting internal organs.

This document establishes guidelines to protect the health of NCDOT employees from these air contamination hazards. It includes training provisions for affected employees and discussion on the warning signs of air contaminant overexposure. Discussion is also presented concerning when work area evaluations may be required. Additionally, this document presents a brief exposure assessment methodology and a control recommendation hierarchy.

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This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure applies to all shop areas, offices, warehouses, production areas, equipment operations, construction sites, repair and maintenance facilities, and water, rail, and air transportation. It also applies primarily to chemical contaminants. (Biological contaminants are addressed in SPP# 1910.1030, Bloodborne Pathogens.)

This safety policy and procedure also affects any employee who, as result of his or her job duties, is exposed to air contaminants.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.1000) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.1100-1140).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, air contaminants will be identified and measured where there is suspicion of air contamination in the workplace. When air contaminant hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Air Contaminants will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Air Contaminants. It is also the responsibility of each NCDOT employee to report immediately unsafe conditions to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities.

6.1 Definitions

ACGIH

American Conference of Governmental Industrial Hygienists.

Administrative Controls

These are non-engineering controls which are used to reduce or eliminate exposure to harmful contaminants. Examples are work rotation, product substitution, pre-employment evaluations, timed exposures, etc.

AIHA

American Industrial Hygiene Association.

Ceiling Values

Concentrations designated by a “c” designation preceding a value which shall not be exceeded at any time during the work shift. If instantaneous readings are not feasible, then the ceiling value shall be assessed based on a 15 minute time interval.

Eight (8) Hour Time Weighted Average (TWA)

The amount of exposure determined based on an eight (8) hour exposure. Sampling should be for at least six (6) hours of the eight (8) hour work shift. All substances not designated by a “c” are considered to be an eight (8) hour TWA, Excursion, or Short Term Exposure Level (STEL). For multiple samples collected during the shift, the TWA is calculated by summing each exposure multiplied by the time interval sampled, and dividing by the total time sampled.

$$\text{TWA} = \frac{(C1 \times T1) + (C2 \times T2) \dots (Cn \times Tn)}{T1 + T2 \dots Tn}$$

Where:

C = measured concentration for time interval T

T = time interval in minutes

Engineering Controls

An engineered process where contaminants are removed physically from the work area, diluted with air or treated to render innocuous, or are prevented from becoming airborne. Examples are local exhaust ventilation, general ventilation, enclosures, cyclones, scrubbers, and chemical reactors.

MSDS

Material Safety Data Sheet.

Permissible Exposure Limit (PEL)

Regulatory limits for contaminants that include the following: Eight hour TWA, Short Term Exposure Limit (STEL), Ceiling (c), or Excursion Limits.

Qualified Person

Person who has training and experience in air monitoring, exposure assessment, and workplace evaluations.

Threshold Limit Values

Voluntary limits for contaminants as published by the American Conference of Governmental Industrial Hygienists.

Workplace Exposure Evaluation

Air monitoring for contaminants by a qualified person (Safety Engineer, Industrial Hygienist) who has training and experience in air monitoring exposure assessment and workplace evaluations.

Work Practices

Specific work procedures that are designed to minimize the release of contaminants to the work area. Examples include wet methods, vacuuming instead of sweeping, slower pace, lower equipment speeds, etc.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Warning Signs of Exposure
- Work Area Evaluation
- Exposure Assessment
- Control

6.2.1 Training

Employees who may be exposed to air contaminants in their job duties shall receive training on air contaminants. Their supervisors will also receive this training which will consist of:

- Contaminant name and characteristics (physical and chemical properties)
- Exposure route
- Symptoms of over exposure
- Toxic health effects (acute and chronic)
- Work practices used to reduce exposures
- Engineering controls to reduce exposures
- Administrative controls to reduce exposures

This training shall be provided upon initial employment and/or job reassignment. Retraining shall be provided when job conditions change. Periodic refresher training shall be provided at the discretion of the supervisor.

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Qualified persons who perform air monitoring shall receive additional training. This training shall include:

- Air sampler air flow calibration
- Sample train set ups
- Analytical procedures
- Air monitoring protocols
- OSHA reference methods
- Exposure calculations
- Exposure data statistical analyses

6.2.2 Warning Signs of Overexposure

Overexposure to contaminants may not always show warning signs. Most gases and vapors provide warnings such as headaches, nausea, mucous membrane irritation, nervous system dysfunction, and rashes in a short period of time (minutes to hours). Some gases and most particulates do not have immediate warning signs and are insidious in their health effects (the signs of a disease process may take years to manifest).

Anytime an employee claims to have experienced a warning condition or has become sick while using chemicals or while engaged in a particular process, he or she is to report this condition immediately to his or her supervisor.

6.2.3 Work Area Evaluation

Air contaminants can present a significant threat to an employee's health and safety. Reliable measurements of airborne contaminants are useful for:

- Analyzing the need for engineering controls
- Selecting PPE
- Delineating areas where protection is needed
- Assessing the potential health effects of exposure
- Determining the need for specific medical monitoring

A supervisor should request a review of a work area whenever there is reasonable suspicion of air contamination. Reasonable suspicion can include whenever:

- An employee has complaints
- An employee is seen by a physician for symptoms relating to exposure
- There is a product change
- There is a change in MSDS
- There is a change in the process
- There are other conditions that would be suspected of increasing a risk of exposure

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The suspected work areas shall be evaluated to determine exposure potential based on a review of MSDS, process characteristics, and work practices (Appendix A).

Air sampling shall be performed by a qualified person. The air sampling shall be performed according to standard procedures (OSHA Reference Methods; NIOSH Analytical Methods; ASTM Methods for Air Toxics).

6.2.4 Exposure Assessment

After air sampling and laboratory analyses are completed, exposures will be assessed by the qualified person for determining compliance with regulations, most recent ACGIH TLV's, published toxicological data, and AIHA Exposure Guidelines. Exposure assessment will be evaluated as either exceeds the PEL or is below the PEL based on the recommended NIOSH Exposure Determination and Measurement Strategy (Appendix B).

The determination may require the use of statistical methods to determine compliance. NCDOT will always use the Upper Confidence Limit at the 95 percent confidence level to ensure exposures are in compliance.

Exposure risk assessments shall be conducted periodically at all work areas to ensure compliance with established exposure limits. High risk assessment categories will receive greater frequency of evaluation than those with low risk assessments.

6.2.5 Controls

If employee exposures are above the established PEL, TLV, or manufacturer recommendations, then control of the exposure will be determined by the qualified person. Engineering controls, product substitution, and work practice modification will be given priority over administrative and respiratory protection as control strategies.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads should be generally familiar with exposures in their organization and the location of those exposures. They will also ensure compliance with this safety policy and procedure through their auditing process.

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6.3.2 Supervisors

Supervisors are responsible for ensuring that the PPE is used when required, proper work practices are used, engineering controls are in good operating condition, and administrative controls are used when feasible. Additionally, they are responsible for recognizing possible exposures by odor, mucous membrane irritation, headaches, nausea, visible dust emissions, and vapors.

6.3.3 Employees

Employees shall be responsible for recognizing possible exposures by odor, mucous membrane irritation, headaches, nausea, visible dust emissions, and vapors. Employees are to follow work practices for the process, use PPE as required, activate engineering controls when necessary, and report suspicious circumstances to their supervisors.

6.3.4 Qualified Person

Qualified persons shall be responsible for conducting air monitoring where there is suspicion of air contamination. They shall perform exposure assessments, workplace evaluation, and recommend exposure controls. They shall also provide air contaminants training to affected employees and their supervisors.

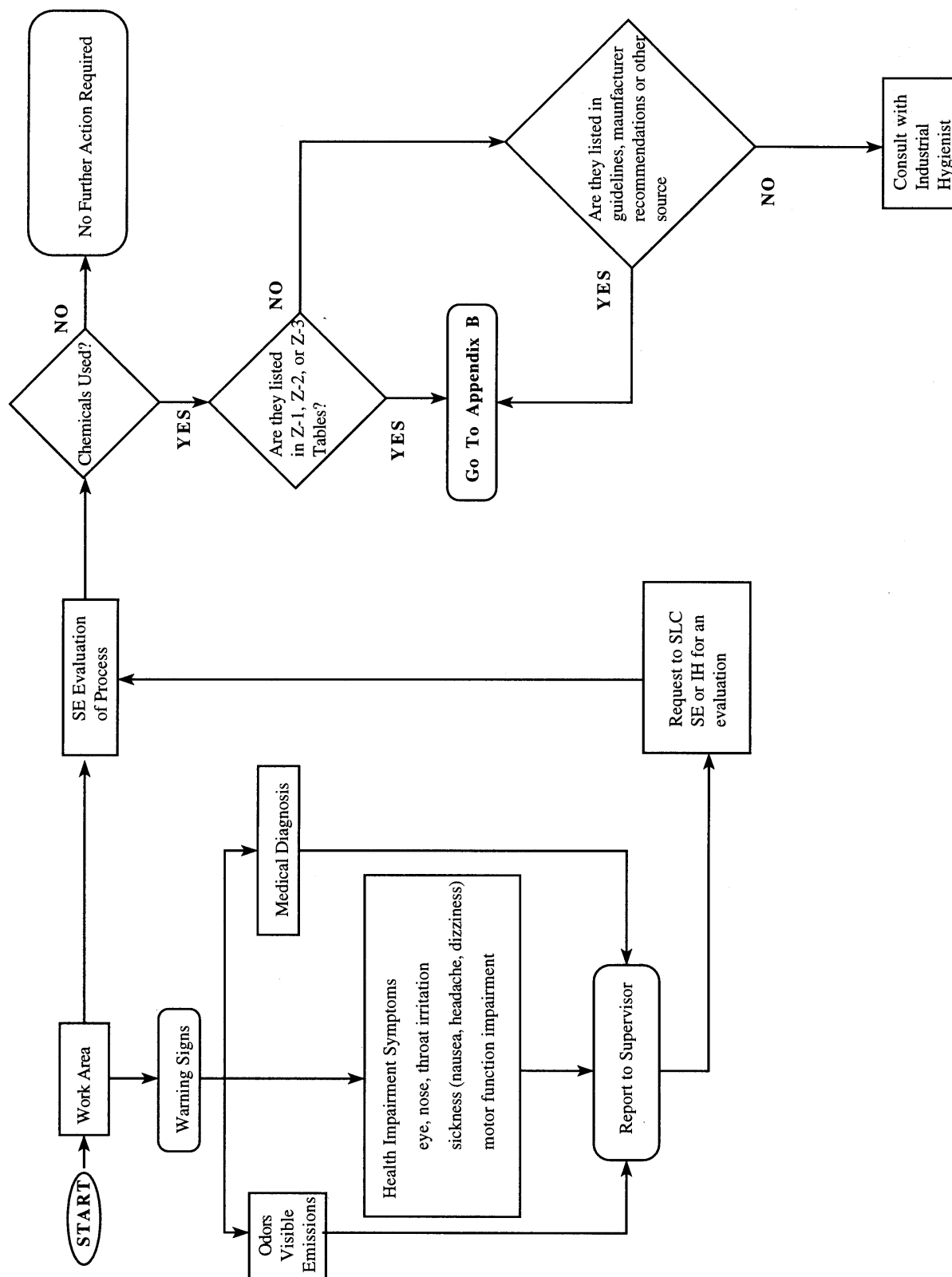
6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Additionally, Safety and Loss Control will be responsible for providing qualified persons to assess, evaluate, and control workplace air contamination. Safety and Loss Control will provide and maintain air monitoring equipment and provide laboratory analyses.

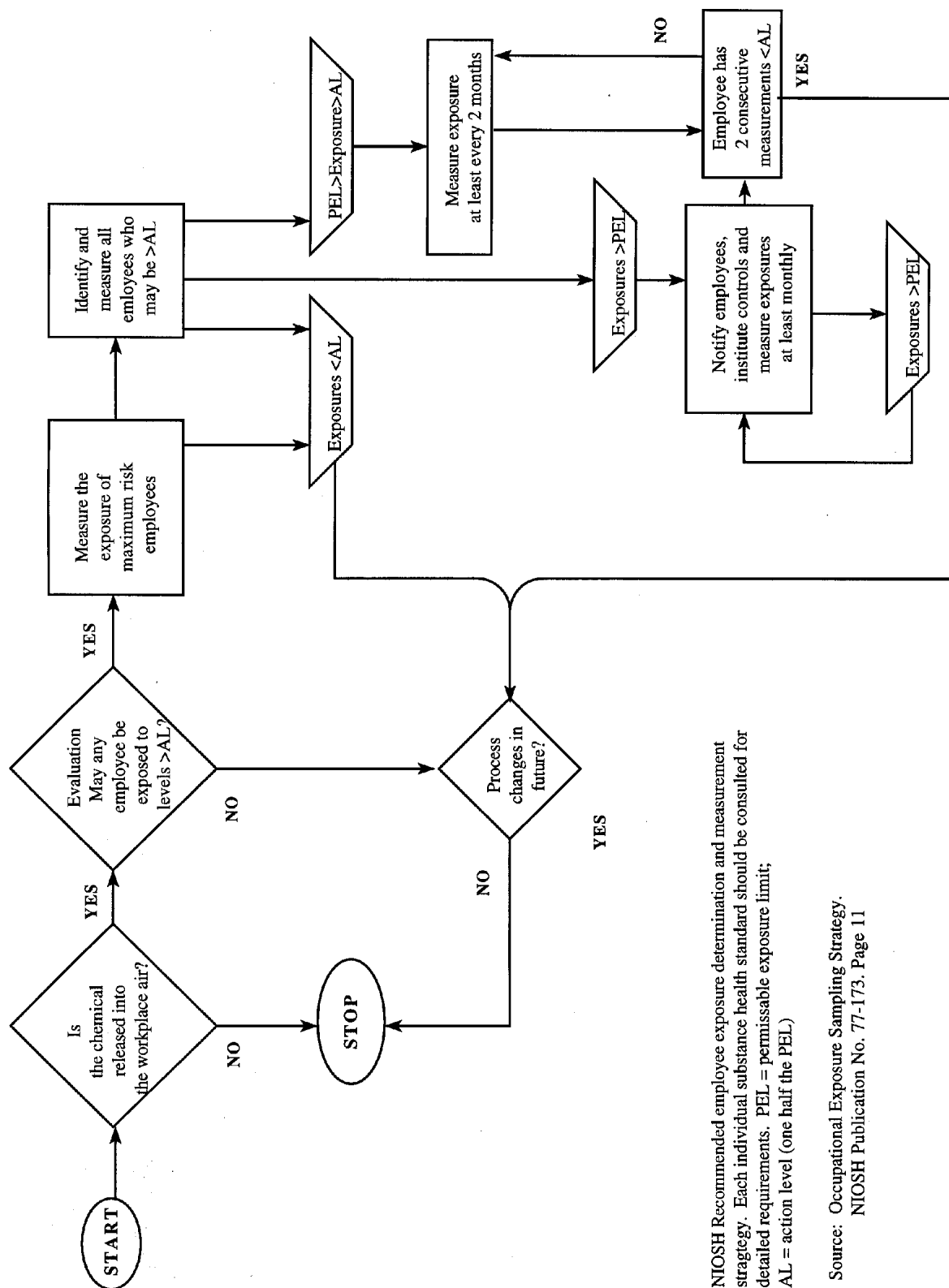
The NCDOT Industrial Hygienist will provide training, expertise, and guidance to the qualified person on air monitoring strategies. The air monitoring data will be evaluated by the Industrial Hygienist for completeness, accuracy, and precision. The Industrial Hygienist is also responsible for procuring and maintaining all air monitoring instrumentation.

Additionally, the Industrial Hygienist will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Work Area Evaluation Flow Chart



APPENDIX B: NIOSH Exposure Determination & Measurement Strategy



Asbestos**SPP# 1910.1001****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines to ensure the prevention of North Carolina Department of Transportation (NCDOT) employee exposure to airborne asbestos fibers.

2.0 Scope and Applicability

Asbestos is the common name for a group of minerals that may appear as masses of compact or relatively long, silky fibers. Asbestos is resistant to heat and corrosive chemicals.

Asbestos fibers are carried into the body as airborne particles. These fibers can become embedded in the tissues of the lung and digestive system. Once the fibers become trapped in the lung's air sacs, they are removed very slowly. Years of exposure to asbestos can cause a number of disabling and fatal diseases.

This safety policy and procedure establishes prevention and assessment practices for asbestos related job activities. It does not address management practices associated with asbestos removal projects. See [SPP #1910.1001A, Asbestos Management](#), for those details.

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This safety policy and procedure includes training provisions and discussion on the forms of asbestos. It also presents asbestos related NCDOT job activities and asbestos sign requirements. This safety policy and procedure presents discussion on the significance of Permissible Exposure Levels and how asbestos exposures will be assessed. Additionally, it presents provisions for medical surveillance and recordkeeping requirements.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any employee who as a result of his or her job duties is exposed to asbestos.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.139 and 1910.1001), Occupational Safety and Health for Construction Standard (29 CFR 1926.1101), and for Maritime Standard (29 CFR 1915.1001).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious harm to employees. Therefore, asbestos materials will be handled such that employees' exposures do not exceed the Permissible Exposure Levels (PEL). When asbestos hazards exist that cannot be eliminated, then engineering controls, administrative controls, proper work practices, Personal Protective Equipment (PPE), and employee training will be implemented to reduce exposures below the PEL. These measures will be implemented to minimize asbestos hazards in order to ensure the safety of employees.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Asbestos. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Asbestos.

6.1 Definitions

Asbestos

Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

Asbestos-Containing Material (ACM)

Any material containing more than 1 percent asbestos.

Authorized Person

Any person authorized by the employee and required by work duties to be present in regulated areas.

Building/Facility Owner

The legal entity, including a lessee, which exercises control over management and recordkeeping functions relating to a building and/or facility in which activities governed by this standard take place.

Class I Asbestos Work

Activities involving the removal of thermal system insulation and surfacing asbestos-containing material or presumed asbestos-containing material in amounts greater than 25 linear feet or 10 square feet, respectively.

Class II Asbestos Work

Activities involving the removal of asbestos-containing material which is not thermal system insulation or surfacing material insulation. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

Class III Asbestos Work

Repair and maintenance operations, where “asbestos-containing material,” including thermal system insulation and surfacing material, is likely to be disturbed.

Class IV Asbestos Work

Maintenance and custodial activities during which employees contact asbestos-containing material and presumed asbestos-containing material and activities to clean up waste and debris containing asbestos-containing material or presumed asbestos-containing material.

Employee Exposure

Exposure to airborne asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals that could occur if the employee were not using respiratory protective equipment.

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Fiber

A particulate form of asbestos, tremolite, anthophyllite, or actinolite, 5 micrometers or longer, with a length-to-diameter of at least 3 to 1.

High-Efficiency Particulate Air Filter (HEPA)

A filter capable of trapping and retaining at least 99.97 percent of 0.3 micrometer diameter mono-disperse particles.

National Institute of Standards and Technology (NIST)

The agency responsible for establishing a national laboratory accreditation program for the analysis of asbestos in materials and associated quality control.

National Voluntary Laboratory Accreditation Program (NVLAP)

An asbestos analytical laboratory which participates in the NIST quality control program and has a unique number. All suspect material samples shall be sent to a NVLAP laboratory.

Presumed Asbestos-Containing Material (PACM)

Thermal insulation, surfacing material, and flooring material found in buildings constructed no later than 1980. This may be rebutted with material sampling and laboratory analysis reporting negative results.

Regulated Area

An area established by the employer to demarcate areas where airborne concentrations of asbestos exceed, or can reasonably be expected to exceed, the permissible exposure limit.

Surfacing ACM

Material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes) which contains more than 1 percent asbestos.

Thermal System Insulation (TSI)

Asbestos-containing material applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain and that contains more than 1 percent asbestos.

Tremolite, Anthophyllite, or Actinolite

The non-asbestos form of these minerals and any of these minerals that have been chemically treated and/or altered.

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6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Employee Training
- Forms of Asbestos
- NCDOT Asbestos Related Work Activities
- Signs
- Permissible Exposure Limits
- Exposure Assessment
- PPE
- Medical Surveillance
- Recordkeeping

6.2.1 Employee Training

Employees who may be exposed to asbestos in their job duties will be trained in all procedures and safety methods. The training program will contain at a minimum the following information:

- The health effects associated with asbestos exposure
- The relationship between smoking and exposure to asbestos
- The quantity, location, manner of use, release, and storage of asbestos and the specific nature of operations which could result in exposure to these minerals
- The engineering controls and work practices associated with the employee's job assignment
- The specific procedures implemented to protect employees from exposure to asbestos
- The purpose, proper use, and limitations of respirators and protective clothing
- The purpose and a description of the medical surveillance program
- The content of the standard including appendices
- The names, addresses, and phone numbers of public health organizations which provide information, materials, and/or conduct programs concerning smoking cessation
- The requirements for posting signs and affixing labels and the meaning of the required legends for such signs and labels
- Access to information and training materials
- Copies of the standard and training information

Employee training records will be maintained for at least one year after the last day of employment.

This training shall be provided upon initial job assignment. Refresher training shall be provided annually.

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6.2.2 Forms of Asbestos

Asbestos-containing products come in 2 forms:

- Friable
- Nonfriable

Friable asbestos is a material that contains more than 1 percent asbestos by weight that can be crumbled, pulverized, or, when dry, reduced to powder by hand pressure. Examples of friable, asbestos materials include sprayed-on fireproofing, ceiling treatments, and pipe insulation.

Nonfriable asbestos is a material that contains more than 1 percent asbestos by weight that cannot be crumbled, pulverized or, when dry, reduced to powder by hand pressure. Examples of nonfriable asbestos materials include floor tile, mastics, and transite cement sheeting.

The form that asbestos products take in the workplace determines the potential airborne exposure risk. Friable asbestos materials can present a higher exposure risk than nonfriable materials.

Asbestos has many different applications but is used most frequently in building products, insulating materials, friction materials, and textiles. Asbestos materials may be sprayed on structural beams as fireproofing. Asbestos materials may also be found in boiler and pipe insulation, stage curtains, and ceiling treatments on plaster or sheetrock.

Manufactured asbestos products have included floor and ceiling tiles, brake and clutch linings, paints and sealants, patching and taping compounds, and transite cement panels.

Refer to Appendix A for a more complete listing of asbestos-containing materials. Thermal system insulation and surfacing material installed prior to 1980 shall be considered to contain asbestos greater than 1 percent until a negative determination is made. It is noted that other types of construction material may contain asbestos-containing material if installed after 1980.

6.2.3 NCDOT Asbestos Related Work Activities

Within NCDOT, certain job activities bring employees into contact with asbestos-containing materials. These job activities include:

- Vehicle brake maintenance
- Facilities maintenance
- Ferry boat maintenance
- Building renovation and demolition

Employees involved in these job activities are required to adhere to certain precautionary practices. PPE may also be required depending upon the

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specific job activity and the amount of airborne friable asbestos. Appendix B presents work practices and engineering controls for automotive brake work. NCDOT will ensure that no employee who works with asbestos-containing materials is exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air measured as an 8 hour time weighted average (8 hour TWA).

It shall be determined if materials contain asbestos before any building renovation and/or demolition activities begin. TSI, surfacing material, flooring material, and other materials known to contain asbestos, installed prior to 1980, shall be presumed to contain asbestos. To determine if suspect materials do not contain asbestos, they must be sampled and analyzed for asbestos by a NVLAP laboratory.

Sampling of suspect material shall be performed only by North Carolina accredited asbestos inspectors.

NCDOT personnel will not be used for any asbestos removal work (Class I and Class II type work as defined in 1926.1101). This type of work shall be performed by contractors experienced in asbestos removal or, under some circumstances, a general contractor that has personnel trained in asbestos removal. See [SPP #1910.1001A, Asbestos Management](#), for additional details.

6.2.4 Signs

Warning signs will be provided and displayed at each regulated area. In addition, warning signs will be posted at all approaches to regulated areas so that an employee may read the signs and take necessary protective steps before entering the area.

Warning signs will be designed large enough to be clearly understood and will indicate the particular danger involved such as cancer and lung disease, authorized personnel only, etc.

Warning labels will be placed on all materials, containers, tools, clothing, or other articles that have been exposed to asbestos, tremolite, anthophyllite, and actinolite to warn employees of the potential for exposure.

Signs shall be posted at entrances to mechanical rooms/areas which contain TSI or surfacing asbestos-containing material/presumed asbestos-containing material and in which employees reasonably can be expected to enter. The signs must identify the material present.

Previously installed and identified asbestos-containing material/ presumed asbestos-containing material must be labeled in areas where the label will be clearly noticed. Wording of signs/labels shall be as follows:

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DANGER CONTAINS ASBESTOS FIBERS AVOID CREATING DUST CANCER AND LUNG DISEASE HAZARD

6.2.5 Permissible Exposure Limits (PEL)

Additionally, NCDOT will ensure that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 fiber per cubic centimeter of air as averaged over a sampling period of 30 minutes (Excursion Limit).

Since asbestos is a carcinogen, NCDOT will ensure that its employees are exposed to the lowest level feasible and will provide respirators to protect employees whenever they are using or handling asbestos materials.

6.2.6 Exposure Assessment

Air monitoring will be conducted in accordance with the OSHA Reference Method (Appendix of A of 1926.1101; 1910.1001; 1915.1001). The air monitoring results shall be reviewed by a Certified Industrial Hygienist (CIH).

6.2.7 Personal Protective Equipment (PPE)

Respirators will be provided and used by employees under the following circumstances:

- Where exposures exceed the 8 hour TWA PEL or the 30 minute Excursion Limit or whenever using or handling asbestos-containing material(s)
- For all Class I and Class II work
- In work situations where feasible engineering and work practice controls are not yet sufficient to reduce exposure to or below the TWA
- In any emergencies where work is necessary
- Whenever an employee desires to use a respirator or the Safety Engineer or Industrial Hygienist determines that an employee requires the use of a respirator

Respirators are mandatory for Class I, II, and III work regardless of the exposure level. Other types of exposure to asbestos will be evaluated and the respirator selected will be based on the level of exposure and in conformance with the applicable table.

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Respirators will be selected in conformance with the NCDOT Written Respirator Program and the safety policy and procedure for Respirator Protection. Under no circumstances will a single use (disposable type) respirator be used for protection against airborne asbestos fibers.

6.2.8 Medical Surveillance

NCDOT personnel who handle, use, or are exposed to asbestos-containing material in excess of the PELs shall be included in a medical surveillance program. The program shall include the completion of the work/personal history form, examination by a licensed physician, pulmonary function testing, and x-ray of the lungs. For related information, see [SPP # 1910.20, Access to Medical Records](#).

6.2.9 Recordkeeping

NCDOT shall maintain the following records:

- Exposure records for 30 years
- Training records for at least one year after employee termination
- Medical surveillance records for 30 years after termination
- Records of asbestos-containing material / presumed asbestos-containing material for as long as the facility exists

NCDOT will maintain an accurate record of all measurements taken to monitor employee exposure to asbestos, tremolite, anthophyllite, or actinolite. These records will include the following information:

- The date of the measurement
- The operation involving exposure to asbestos, tremolite, anthophyllite, or actinolite which is being monitored
- Sampling and analytical methods used and evidence of their accuracy
- Number, duration, and results of samples taken
- Type of respiratory protective devices worn
- Names, social security numbers, and exposures of the employees whose exposures are represented

This record will be maintained for at least 30 years and be made available to employees or regulatory agencies upon demand.

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6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that adequate funds are available and budgeted for the purchase of asbestos protection related equipment in their areas. They will also identify the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities related to asbestos handling or removal.

Supervisors will communicate appropriate needs to managers/unit heads and/or supervisors.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.4 Building Owner/Lessee

It is the responsibility of the building owner/lessee to notify:

- Prospective employers applying for or bidding on work whose employees reasonably can be expected to work in or adjacent to areas containing asbestos-containing material
- Employees of the owner/lessee who will work in or adjacent to areas with asbestos-containing material
- On multi-employer worksites, all employees who will be performing work in or adjacent to areas containing asbestos-containing material
- Tenants who will occupy areas containing asbestos-containing material

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will provide and maintain air monitoring equipment and provide laboratory

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analyses. Safety and Loss Control shall have responsibility for conducting asbestos air monitoring or provide contract services for such air monitoring.

The Industrial Hygienist will provide training, expertise, and guidance on air monitoring strategies. The air monitoring data will be evaluated by the Industrial Hygienist for completeness, accuracy, and precision.

Additionally, the Industrial Hygienist will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

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APPENDIX A: Sample List of Suspected Asbestos-Containing Materials

There are over 3600 commercial products that contain asbestos. Materials with an asbestos content greater than 1 percent may be found in the following materials:

- Cement Pipes
- Cement Wallboard
- Cement Siding
- Asphalt Floor Tile
- Vinyl Floor Tile
- Vinyl Sheet Flooring
- Flooring Backing
- Construction Mastics
(floor tile, carpet, ceiling tile, etc.)
- Acoustical Plaster
- Decorative Plaster
- Textured Paints/Coating
- Ceiling Tiles and Lay-in Panels
- Spray-Applied Insulation
- Blown-in Insulation
- Fireproofing Materials
- Taping Compounds (thermal)
- Packing Materials
(for wall/floor penetrations)
- High Temperature Gaskets
- Laboratory Hoods/Table Tops
- Fire Blankets
- Fire Curtains
- Elevator Equipment Panels
- Elevator Brake Shoes
- HVAC Duct Insulation
- Boiler Insulation
- Breeching Insulation
- Ductwork Flexible Fabric Connections
- Cooling Towers
- Pipe Insulation
(corrugated air-cell, block, etc.)
- Heating and Electrical Ducts
- Electrical Panel Partitions
- Electric Wiring Insulation
- Chalkboards
- Roofing Shingles
- Roofing Felt
- Base Flashing
- Thermal Paper Products
- Fire Doors
- Caulking/Putties
- Adhesives
- Wallboard
- Joint Compounds
- Vinyl Wall Coverings
- Spackling Compounds

NOTE: This list does not include every product/material that may contain asbestos. It is intended as a general guide to show which types of materials may contain asbestos.

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APPENDIX B: Work Practices and Engineering Controls for Automotive Brake Work

This appendix specifies engineering controls and work practices that must be implemented by NCDOT during automotive brake and clutch inspection, disassembly, repair, and assembly operations. Proper use of these engineering controls and work practices will reduce employees' asbestos exposure below the permissible exposure level during clutch and brake inspection, disassembly, repair, and assembly operations.

NCDOT shall institute engineering controls and work practices using either the *Negative Pressure Enclosure/HEPA Vacuum System Method* or the *Low Pressure/Wet Cleaning Method* of this appendix. Any other method which NCDOT can demonstrate to be equivalent in terms of reducing employee exposure to asbestos as defined and which meets the requirements described in *Equivalent Methods* of this appendix may be used. For those facilities in which no more than 5 pairs of brakes or 5 clutches are inspected, disassembled, reassembled and/or repaired per week, the *Wet Method* of this appendix may be used. The work practices and controls associated with each of these methods are described in the following sections.

Negative Pressure Enclosure/HEPA Vacuum System Method

- The brake and clutch inspection, disassembly, repair, and assembly operations shall be enclosed to cover and contain the clutch or brake assembly and to prevent the release of asbestos fibers into the worker's breathing zone.
- The enclosure shall be sealed tightly and thoroughly inspected before work begins on brake and clutch inspection, disassembly, repair, and assembly.
- The enclosure shall be such that the worker can clearly see the operation and shall provide impermeable sleeves through which the worker can handle the brake and clutch inspection, disassembly, repair and assembly. The integrity of the sleeves and ports shall be examined before work begins.
- A HEPA-filtered vacuum shall be employed to maintain the enclosure under negative pressure throughout the operation. Compressed-air may be used to remove asbestos fibers or particles from the enclosure.
- The HEPA vacuum shall be used first to loosen the asbestos containing residue from the brake and clutch parts and then to evacuate the loosened asbestos containing material from the enclosure and capture the material in the vacuum filter.
- The vacuum's filter, when full, shall be first wetted with a fine mist of water, then removed and placed immediately in an impermeable container, properly labeled with asbestos warning labels and disposed of in sealed impermeable bags or other closed impermeable containers.
- Any spills or releases of asbestos containing waste material from inside of the enclosure or vacuum hose or vacuum filter shall be immediately cleaned up and disposed of in sealed impermeable bags or other closed impermeable containers.

APPENDIX B: Work Practices and Engineering Controls for Automotive Brake Work (Continued) 2

Low Pressure/Wet Cleaning Method

- A catch basin shall be placed under the brake assembly, positioned to avoid splashes and spills.
- The reservoir shall contain water containing an organic solvent or wetting agent. The flow of liquid shall be controlled such that the brake assembly is gently flooded to prevent the asbestos-containing brake dust from becoming airborne.
- The aqueous solution shall be allowed to flow between the brake drum and brake support before the drum is removed.
- After removing the brake drum, the wheel hub and back of the brake assembly shall be thoroughly wetted to suppress dust.
- The brake support plate, brake shoes and brake components used to attach the brake shoes shall be thoroughly washed before removing the old shoes.
- In systems using filters, the filters, when full, shall be first wetted with a fine mist of water, then removed and placed immediately in an impermeable container, labeled with asbestos warning labels and disposed of in sealed impermeable bags or other closed impermeable containers.
- Any spills of asbestos-containing aqueous solution or any asbestos-containing waste material shall be cleaned up immediately and disposed of in sealed impermeable bags or other closed impermeable containers.
- The use of dry brushing during low pressure/wet cleaning operations is prohibited.

Equivalent Methods

An equivalent method is one which has sufficient written detail so that it can be reproduced and has been demonstrated that the exposures resulting from the equivalent method are equal to or less than the exposures which would result from the use of the *Negative Pressure Enclosure/HEPA Vacuum System Method* of this appendix. For purposes of making this comparison, NCDOT shall assume that exposures resulting from the use of the *Negative Pressure Enclosure/HEPA Vacuum System Method* shall not exceed 0.004 f/cc, as measured by the OSHA reference method and as averaged over at least 18 personal samples.

Asbestos Management

SPP# 1910.1001A

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines to ensure the prevention of North Carolina Department of Transportation (NCDOT) employee exposure to airborne asbestos fibers.

2.0 Scope and Applicability

Asbestos is the common name for a group of material minerals that may appear as masses of compact or relatively long, silky fibers. Asbestos is resistant to heat and corrosive chemicals.

Asbestos fibers are carried into the body as airborne particles. These fibers can become embedded in the tissues of the lung and digestive system. Once the fibers become trapped in the lung's air sacs, they are removed slowly. Years of exposure to asbestos can cause a number of disabling and fatal diseases.

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This document establishes management practices associated with asbestos removal projects.

This safety policy and procedure includes training provisions, a listing of materials that contain asbestos, and guidelines for areas suspected of containing asbestos materials. It also presents discussions on building materials and inspections, renovation/demolition guidelines, and administrative controls requirements. Details are also presented for emergency situations, notification requirements, recordkeeping, work practices, decision trees, and forms.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects building owners, facility managers, leasee's, maintenance personnel, custodial personnel and building occupants.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.1001), Occupational Safety and Health for Construction Standard (29 CFR 1926.1101), Maritime Standard (29 CFR 1915.1001) North Carolina Hazardous Materials Management Branch Rules (HMMB) [15A NCAC 19C Sections .0601 through .0609], and National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious harm to employees. Therefore, NCDOT has implemented an operations and management (O and M) program to control the release of asbestos fibers from asbestos containing materials. The O and M Program details responsibilities of management, notification, recordkeeping, worker protection, training, hazard awareness, administrative controls, work practices and surveillance within NCDOT.

5.0 General Responsibilities

It is the responsibility of each manager/unit head and facility manager to ensure implementation of NCDOT's safety policy and procedure on Asbestos Management.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities.

6.1 Definitions

Accredited Air Monitor

An individual who has a high school diploma and least three months of asbestos air monitoring experience as, or under the direct supervision of, an accredited supervising air monitor and has successfully completed a NIOSH 582 Course or HMMB approved course and the 5 day Asbestos Supervisor Course or the Project Monitoring Course. HMMB will issue an identification number and card which must be carried on the person.

Accredited Designer

An individual who has a high school diploma and least three months of asbestos related experience as, or under the direct supervision of, an accredited designer and has successfully passed an AHERA approved designer course. HMMB will issue an identification number and card which must be carried on the person.

Accredited Inspector

An individual who has a high school diploma and least three months of asbestos related experience as, or under the direct supervision of an accredited inspector and has successfully completed the three day AHERA approved asbestos inspector training. HMMB will issue an identification number and card which must be carried on the person.

Accredited Management Planner

An individual who has a high school diploma and is an accredited inspector and has successfully completed the two day AHERA approved asbestos management training course. HMMB will issue an identification number and card which must be carried on the person.

Accredited Supervising Air Monitor

An individual who is a Certified Industrial Hygienist and has least three months of asbestos related experience and has successfully completed an AHERA approved Supervision course and the three day HMMB approved respirator training course. HMMB will issue an identification number and card which must be carried on the person.

Accredited Supervisor

An individual who has a high school diploma and least three months of asbestos related experience as, or under the direct supervision of an accredited supervisor and has successfully passed a 4 or 5 day AHERA approved supervisor course. HMMB will issue an identification number and card which must be carried on the person.

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Accredited Worker

An individual who has successfully completed an AHERA approved asbestos worker course. AHMB will issue an identification number and card which must be carried on the person.

Asbestos

Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

Asbestos-Containing Material (ACM)

Any material containing more than 1 percent asbestos.

Building/Facility Owner

The legal entity, including a lessee, which exercises control over management and record keeping functions relating to a building and/or facility in which activities governed by this standard take place.

Category I Non-Friable Asbestos-Containing Material

Asbestos containing packing, gaskets, resilient flooring covering, and asphalt roofing products containing more than one percent asbestos measured by polarized light microscopy .

Category II Non-Friable Asbestos

Any material that is not Category I non-friable ACM containing more than one percent asbestos measured by polarized light microscopy.

Cutting

To penetrate with a sharp-edged instrument and includes sawing, but does not include shearing, slicing, or punching.

Demolition

The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.

Facility

Any institutional, commercial, public, industrial, or residential structure, installation, or building, excluding residential with four or less units, any ship and any active or inactive waste disposal site.

Friable Asbestos

Material containing one percent or more of asbestos as determined by polarized light microscopy, that when dry can be crumbled, pulverized, or reduced to powder by hand pressure.

SAFETY POLICY & PROCEDURE

Grinding

To reduce to powder or small fragments. Includes mechanical chipping or drilling.

Hazardous Materials Management Branch (HMMB)

The legal entity in North Carolina responsible for NESHAP - Asbestos enforcement. It is a section of Division of Epidemiology, Department of Environment, Health and Natural Resources.

High-Efficiency Particulate Air Filter (HEPA)

A filter capable of trapping and retaining at least 99.97 percent of 0.3 micrometer diameter mono-disperse particles.

Leak-Tight

Solids or liquids are contained in a manner that will prevent their leakage or spilling.

National Institute of Standards and Technology (NIST)

The agency responsible for establishing a national laboratory accreditation program for the analysis of asbestos in materials and associated quality control.

National Voluntary Laboratory Accreditation Program (NVLAP)

An asbestos analytical laboratory which participates in the NIST quality control program and has a unique number. All suspect material samples shall be sent to a NVLAP laboratory.

Non-Friable Asbestos

Material containing one percent or more of asbestos as determined by polarized light microscopy, that when dry cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Operations and Maintenance (O&M)

A program that controls the release of fibers to the environment and protects health by integrating inspections, hazard assessment, controlled access and administrative controls into a functional plan.

Owner/Operator of a Demolition or Renovation Activity

Any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

Particulate Asbestos

Finely divided particles of asbestos or material containing asbestos.

Planned Renovation Activity

A renovation operation, or a number of such operation, in which some RACM will be removed or stripped within a given period of time and that can be predicted.

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Poor Condition

The binding of the material that is losing its integrity as indicated by peeling, cracking, or crumbling of the material.

Polarized Light Microscopy (PLM)

An EPA method for determining the presence of asbestos and the content of materials suspected of containing asbestos. The method is detailed in appendix A, subpart F, 40 CFR part 763 section 1. The laboratory performing the analyses shall be NVLAP accredited.

Presumed Asbestos-Containing Material (PACM)

Thermal insulation, surfacing material and flooring material found in buildings constructed no later than 1980. This may be rebutted with material sampling and laboratory analysis reporting negative results.

Regulated Area

An area established by the employer to demarcate areas where airborne concentrations of asbestos exceed, or can reasonably be expected to exceed the permissible exposure limit.

Regulated Asbestos-Containing Material (RACM)

Material that is (a) friable, (b) Category I nonfriable ACM that has become friable, (c) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of the demolition or renovation operations.

Remove

To take out RACM or facility components that contain or are covered with RACM from any facility.

Renovation

Altering a facility or one or more facility components in any way, including the stripping or removal of RACM from a facility component.

Resilient Floor Covering

Asbestos containing floor tile, and sheet vinyl floor covering containing more than one percent asbestos determined by PLM.

Strip

To take off RACM from any part of a facility or facility components.

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Surfacing ACM

Material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes) which that contains more than 1 percent asbestos.

Thermal System Insulation (TSI)

ACM applied to pipes, fittings, boilers, breeching, tanks, ducts or other structural components to prevent heat loss or gain and that contains more than 1 percent asbestos.

Transmission Electron Microscopy (TEM)

The process of analyzing particulate collected on filters by transmission electron microscopy using energy dispersive radiation to identify specific asbestos fibers. The required method is defined in 40 CFR Part 763, Subpart E.

Visible Emissions

Any emissions, which are visually detectable without the aid of instruments, coming from RACM or asbestos-containing material.

Waste Generator

Any owner or operator of a source covered by NESHAP whose act or process produces asbestos-containing waste material.

Waste Shipment Record

The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. The provisions are:

- Training
- Materials Containing Asbestos
- Areas with Suspected or Known Asbestos Materials
- Building Materials and Inspections
- Renovation/Demolition
- Administrative Controls
- Emergency Situations
- Notifications
- Recordkeeping
- Work Practices
- Decision Trees
- Forms

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6.2.1 Training

NCDOT will provide training to ensure employees and building occupants who may be exposed to asbestos are properly and adequately trained in all procedures and safety methods related to asbestos. The training program will contain as a minimum the following information:

- The health effect associated with asbestos exposure.
- The relationship between smoking and exposure to asbestos in producing lung cancer.
- The quantity, location, manner of use, condition, and storage of and the specific nature of operations which could result in exposure to these minerals.
- The engineering controls and work practices associated with the employee's job assignment.
- The specific procedures implemented to protect employees from exposure to asbestos such as work practices, emergency and clean-up procedures, and personal protective equipment (PPE) to be used.
- The purpose and a description of the medical surveillance program.
- The names, addresses and phone numbers of public health organizations which provide information, materials and/or conduct programs concerning smoking cessation.
- The requirements for posting signs and affixing labels and the meaning of the required legends for such signs and labels.
- Access to information and training materials.
- Copies of the standard, guidelines and training information.

Training records will be maintained at least one year after the last day of employment for the employee.

Outside contractors who may come into contact with ACM/PACM shall also be trained. Copies of their training should be submitted for review prior to their activity involving asbestos.

6.2.2 Materials Containing Asbestos

There are over 3600 commercial products that contain asbestos. Materials with an asbestos content greater than 1 percent may be found in the following materials: pipe insulation, boiler insulation, breeching, HVAC duct tape, HVAC flex fittings, flooring materials, mastics, adhesives, brakes, clutches, gaskets, ceiling panels/tiles, ceiling surfacing material, fire doors, fireproofing, window glazing, caulking, tapes, wall board compound, wall board, plastic, paper and paint.

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Refer to Appendix A for a more complete listing. Thermal system insulation and surfacing material installed prior to 1980 shall be considered as containing asbestos greater than 1 percent until a negative determination is made. It is noted that other types of construction material may contain ACM although it may be installed after 1980.

6.2.3 Areas with Suspected or Known Asbestos Materials

The following areas in NCDOT are likely to contain varying amounts of asbestos. However, these areas pose no immediate health risk to employees as long as asbestos containing areas are not disturbed. These areas include:

- Office areas
- Shop areas
- Storage areas
- HVAC rooms
- Mechanical rooms
- Pipe chases
- Air plenums
- Boiler rooms
- Roofs
- Crawl spaces
- Disposal sites

6.2.4 Building Materials and Inspections

Most building materials are suspected of containing asbestos material. To assure that the materials do not contain asbestos, an inspection by an accredited inspector shall be performed on all facilities owned, leased or used by NCDOT. Sampling of suspect material shall be performed only by North Carolina accredited asbestos inspectors.

Asbestos material in buildings is grouped or categorized as follows:

- Friable
- Non-friable
 - Category I non-friable
 - Category II non-friable
- Regulated ACM

A database shall be established by Facilities Management to allow facility managers to determine the location, quantity and condition of building ACM and building materials that do not contain asbestos. Known or suspected ACM shall be examined at least every 6 months to determine their condition or sooner if their condition has been reported to have changed.

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6.2.5 Renovation/Demolition

Before any renovation or demolition project that will or reasonably likely will disturb building materials, the facility manager shall check the database for presence of asbestos in the materials. If the material is not listed on the data base, the material shall be sampled for asbestos prior to renovation/demolition activity. If the disturbance of ACM shall make it friable (i. e. release fibers to the environment), it is considered regulated material (RACM). Friability determinations shall be made by an accredited inspector or management planner.

RACM greater than 160 square feet or 250 linear feet or 35 cubic feet that will be disturbed during the renovation/demolition are reportable quantities to HMMB. All projects involving the disturbance of these quantities of ACM shall be conducted by licensed asbestos abatement contractors and the projects shall follow the State Construction Office (SCO) Asbestos Abatement Guidelines (latest version). These projects will have to be designed by an accredited designer.

The HMMB Asbestos Permit Application and Notification for Demolition/Renovation (DENHR 3768) shall be filled out prior to the commencement of any demolition or renovation project. It is the policy to have the contractor performing the asbestos abatement to complete and submit the form to HMMB. The contractor cannot start any project until they have a signed HMMB permit form.

Projects where the amounts of ACM disturbed are greater than 3000 square feet of surfacing material or 1500 linear feet of TSI shall require an air monitoring plan by a Supervising Air Monitor and clearance sampling.

For quality assurance purposes, all abatement project documents shall be submitted to Safety and Loss Control for review.

6.2.6 Administration Controls

Small projects (less than 10 square feet of surfacing material or 25 linear feet of TSI) involving the disturbance of ACM shall be controlled by the use of work permits and assuring that the contractor's employees are properly trained or use accredited asbestos abatement workers. A permit system shall be used and no work can be performed until the work permit is signed.

NCDOT employees used for small projects shall be trained in the AHERA 16 to 20 hour Operations and Maintenance (O and M) course. These employees are also regulated by the OSHA Asbestos standards.

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6.2.7 Emergency Situations

Under some circumstances buildings may be damaged (high winds, tornado's, hurricanes, fires, explosions) which may require immediate actions for clean-up. Under these circumstances if it is known that no ACM has been disturbed, then proceed with clean-up. If ACM is known or highly suspected, contact the Safety Engineer to assist in determining the proper course of action.

6.2.8 Notifications

It is the responsibility of the building owner/leasee to notify:

- Prospective employers applying for or bidding work whose employees reasonably can be expected to work in or adjacent to areas containing ACM
- Employees of the owner/leasee who will work or adjacent to areas with ACM
- Tenants who will occupy areas containing ACM

The building owner/lessee shall post signs at the entrance to mechanical rooms/areas in which employees reasonably can be expected to enter and which contain TSI or surfacing ACM/PACM. The signs must identify the material present, the location and the appropriate work practices that will ensure ACM/PCAM will not be disturbed.

Previously installed ACM/PACM identified by the building owner/leasee must be labeled in areas where the label will be clearly noticed. Wording of signs/labels shall be as follows:

**DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD**

6.2.9 Recordkeeping

NCDOT shall maintain the following records:

- Exposure records for thirty years
- Training records for at least one year after employee termination
- Medical surveillance records for thirty years after termination
- Records of ACM/PACM for as long as the facility exists
- Fiber release episodes
- Work permits
- Material surveillance
- Abatement log

These records will be maintained and be made available to employees or regulatory agencies upon demand.

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6.2.10 Work Practices

Class III type work and Class IV type work are the types of work that will be predominately followed within NCDOT.

Class III type work operations includes repair, maintenance, minor renovation, and other tasks where there is intentional disturbance of ACM/PACM but the disturbance is incidental to the task at hand. A disturbance results in a fiber release from ACM/PACM. Work practices for class III type work include:

- Use local exhaust ventilation to the extent feasible and keep the material wet. No dry sweeping of waste material is allowed. All waste material is to be bagged immediately for disposal.
- Where drilling, cutting, abrading, sanding, chipping, breaking, or sawing occurs, use of impermeable dropcloths; isolation of such operations using mini-enclosures or glove bag systems.
- Where there is no negative exposure assessment or where the PEL is exceeded, containment of the area using drop cloths and plastic barriers, or a specific control system listed for Class I work; employees performing work under such circumstances must also use appropriate respiratory protection.
- If feasible the air handling system should be off during the disturbance.

Class IV type work includes minor contact with ACM/PACM and includes such activities as:

- Housekeeping - dusting surfaces, vacuuming carpets, mopping floors and cleaning up ACM debris.
- Maintenance - changing light bulbs, working on a light fixture attached to ceiling with ACM/PACM, floor stripping/polishing and working around mechanical rooms or pipe chases with ACM (TSI).

Employees cleaning up debris and waste in a regulated area where respirators are required, must wear the appropriate respiratory protection.

Waste and debris in areas where friable TSI or surfacing material is accessible, shall be assumed to contain asbestos.

6.2.11 Decision Trees

Use the NESHAP decision tree to determine if the project requires HMMB notification and the use of an asbestos contractor. (See Appendix B.)

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6.2.12 Forms

The following forms will be used for asbestos management:

- ACM Inspection (Appendix C)
- Asbestos Hazard Assessment (Appendix D)
- Surveillance (Appendix E)
- Fiber Release Episodes (Appendix F)
- Work Permit (Appendix G)

Refer to these appendices for additional details.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will be responsible for identifying the employees affected by this safety policy and procedure. They will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with Asbestos Management through their auditing process.

Managers/Unit Heads will know where ACM/PACM is located and its condition.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training perform any of the tasks or activities related to Asbestos Management.

Supervisors will know where ACM/PACM is located and its condition. Supervisors will notify managers/unit heads of fiber release episodes and changes in condition of ACM.

They will ensure that employees have been trained where they may be exposed to asbestos or may come into contact with asbestos.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure and follow proper work practices for the type of work performed. Employees will also notify supervisors of any changes in ACM condition.

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6.3.4 Safety and Loss Control

It is the responsibility of Safety and Loss Control to train, perform work area evaluations, determine exposure assessments and recommend controls to reduce exposure. Risk assessments shall be made based on the exposure assessment and employee duties.

Safety and Loss Control will also be responsible for quality assurance of the asbestos management program to include inspections, hazard assessments, bulk sample analytical, abatement designs, air monitoring and asbestos management. Safety Engineers may be used to collect samples on an as needed basis if they are accredited inspectors.

Additionally, the Industrial Hygienist will:

- Provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure
- Develop an asbestos operations and maintenance program
- Provide expertise on matters relating to asbestos
- Oversee the quality assurance for inspections, designs and projects
- Select a laboratory for the analyses of asbestos
- Review the laboratory's Quality Assurance/Quality Control (QA/QC) program

6.3.5 Facilities Management

Facilities Management will conduct inspections and perform hazard assessment at NCDOT facilities and develop a database on the location, quantity and type of asbestos materials.

6.3.6 Materials and Tests Unit

Materials and Tests Unit shall be responsible for selecting a NVLAP laboratory or laboratories for processing and analyzing bulk samples.

6.3.7 Facility Managers

Each facility manager shall be responsible for implementing the O and M Plan where asbestos-containing materials are present.

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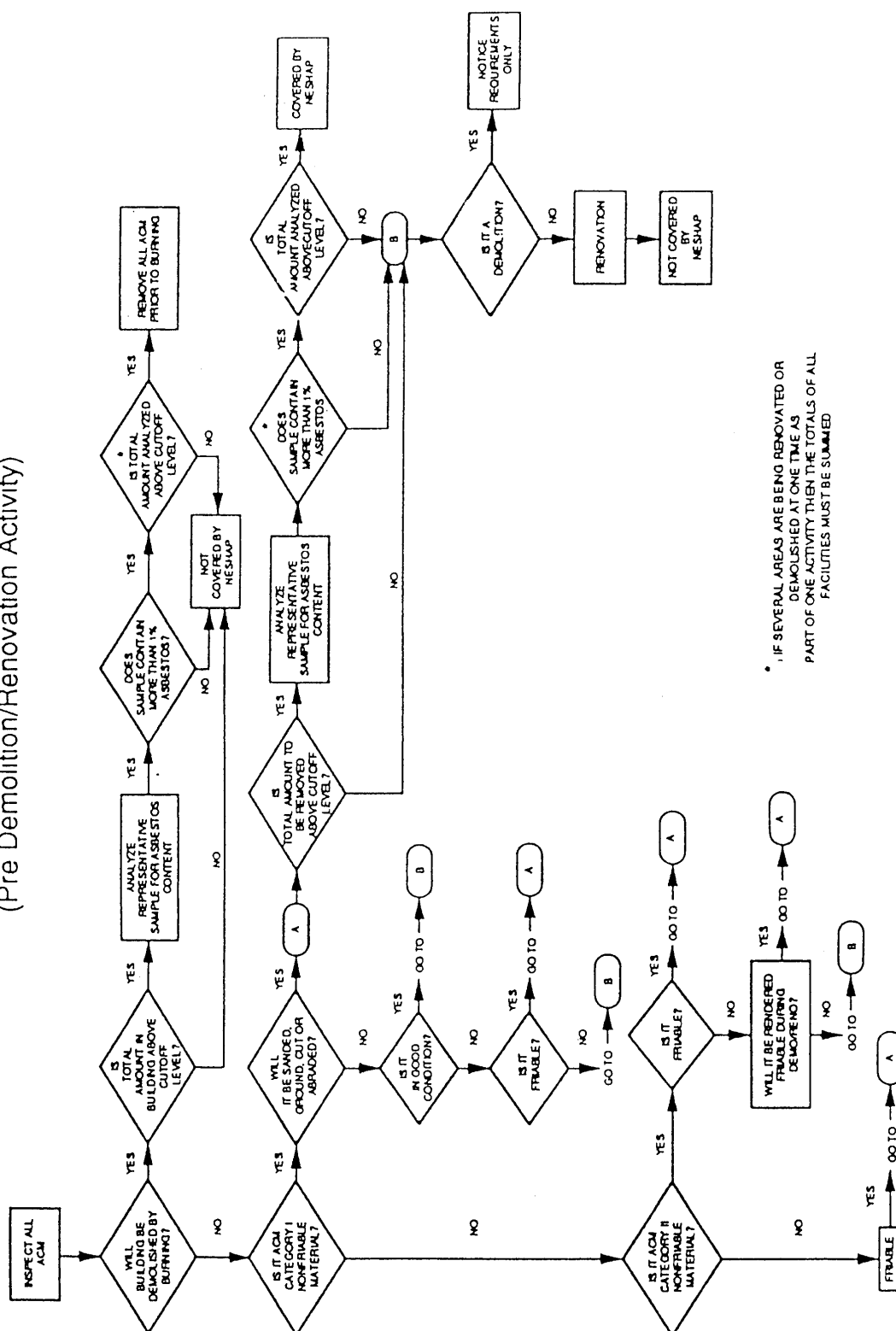
APPENDIX A: Sample List of Suspected Asbestos-Containing Materials

There are over 3600 commercial products that contain asbestos. Materials with an asbestos content greater than 1 percent may be found in the following materials:

- Cement Pipes
- Cement Wallboard
- Cement Siding
- Asphalt Floor Tile
- Vinyl Floor Tile
- Vinyl Sheet Flooring
- Flooring Backing
- Construction Mastics
(floor tile, carpet, ceiling tile, etc.)
- Acoustical Plaster
- Decorative Plaster
- Textured Paints/Coating
- Ceiling Tiles and Lay-in Panels
- Spray-Applied Insulation
- Blown-in Insulation
- Fireproofing Materials
- Taping Compounds (thermal)
- Packing Materials
(for wall/floor penetrations)
- High Temperature Gaskets
- Laboratory Hoods/Table Tops
- Fire Blankets
- Fire Curtains
- Elevator Equipment Panels
- Elevator Brake Shoes
- HVAC Duct Insulation
- Boiler Insulation
- Breeching Insulation
- Ductwork Flexible Fabric Connections
- Cooling Towers
- Pipe Insulation
(corrugated air-cell, block, etc.)
- Heating and Electrical Ducts
- Electrical Panel Partitions
- Electric Wiring Insulation
- Chalkboards
- Roofing Shingles
- Roofing Felt
- Base Flashing
- Thermal Paper Products
- Fire Doors
- Caulking/Putties
- Adhesives
- Wallboard
- Joint Compounds
- Vinyl Wall Coverings
- Spackling Compounds

NOTE: This list does not include every product/material that may contain asbestos. It is intended as a general guide to show which types of materials may contain asbestos.

APPENDIX B: NESHAP Decision Tree

Asbestos NESHAP RACM Decision Tree
(Pre Demolition/Renovation Activity)

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APPENDIX C: NCDOT ACM Inspection Form

Facility: _____

Date: _____

Location: _____

Project ID No. _____

Building: _____

Division _____

District _____

Sample or Visual ID No.	Description of material	COMMENTS: Damage Assessment, Friability, Air Plenum, Air Currents, Accessibility, Contact, Vibration	Est. Amount
	Location: sample and material		
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			

Inspector and NC Accred. No.

PAGE ____ OF ____

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APPENDIX D: NCDOT Asbestos Hazard Assessment Form

Division: _____ Date: _____ Project ID No.: _____

Facility: _____

Location: _____

Building: _____

Homogeneous Area ID No. _____ Description: _____

Location: _____

Material Type: _____

Asbestos Content: Chrysotile _____% Amosite _____% Crocidolite _____%

Quantity: _____

Potential For Fiber Release

Friability: _____

Accessibility: _____

Contact: _____

Damage: Good Condition: _____ Significantly Damaged(>25%): _____ Damaged(<25%): _____

Damage Type: _____

Air Currents: _____

Inside: _____ Outside: _____

Area Usage: _____ No. of persons exposed: _____

Sample ID Nos. _____

NIST Laboratory: _____

Classification

NESHAP: _____ OSHA : _____

Hazard Rating: _____

Response Action:

SKETCH / SPECIAL NOTES

APPENDIX E: Asbestos Surveillance Form

Building: _____
Location: _____

HGA No.	Type of material	Date	Condition	Change since last inspection	Action required

(Signature) (Accred. No.)

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APPENDIX F: Asbestos Fiber Release Episode Form

Fiber Release Episode Form

Division: _____ Unit: _____

Episode Data

Date: _____ Time: _____

Location: _____

Type of material: ☐ Surfacing ☐ TSI ☐ Misc: (describe) _____

Material Classification: ☐ Friable ☐ Non-friable

Type of release: _____

Estimated quantity disturbed: _____

Areas affected from the release: _____

HVAC turned off: (date/time) _____

Exposures: _____

Asbestos Work Permit Issued: YES NO N/A

Actions taken to control exposures: _____

Notifications:

- ☐ Asbestos Program Manager
- ☐ Safety and Loss Control (919) 250-4200
- ☐ Facilities Management
- ☐ O&M personnel
- ☐ Asbestos abatement contractor

(Signature)

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APPENDIX F: Asbestos Fiber Release Episode Form (Continued) 2

Sample

Fiber Release Episode Form

Division: 19 Unit: LABORATORY

Episode Data

Date: 4-15-96 Time: 0900

Location: SUNSET BLDG
101 SOUTH ST
MAPLE, NC

Type of material: Surfacing TSI ☒ Misc: (describe) CEILING TILES

Material Classification: ☒ Friable Non-friable

Type of release: TILES DAMAGED DURING LIGHT FIXTURE REMOVAL

Estimated quantity disturbed: 6 SF

Areas affected from the release: NE CORNER OF LAB.

HVAC turned off: (date/time) 4-15-96 0910

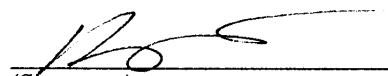
Exposures: LAB. WORKERS ; POSSIBLY OFF. PERS. ; MAINT. WORKERS

Asbestos Work Permit Issued: YES ☒ NO N/A

Actions taken to control exposures: CLOSED LAB. ; CLOSED DOOR ; WET MATERIAL
BARRICADED ENTRY TO ROOM UNTIL ASH PERSONNEL
ARRIVED

Notifications:

- ☒ Asbestos Program Manager
- ☒ Safety and Loss Control (919) 250-4200
- ☒ Facilities Management
- ☒ O&M personnel
- ☐ Asbestos abatement contractor


(Signature)

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APPENDIX G: NCDOT's Asbestos Work Permit Form

TO: Asbestos Program Manager

Job Request No. _____ Start Date: _____

___ ACM is present in the vicinity of the renovation and most likely will not be disturbed during the renovation

___ ACM is present and the disturbance of asbestos may be anticipated

___ ACM will be disturbed during the renovation

Date: _____ Division: _____ Organization/Unit: _____

Requester: Name: _____ Tele. No. _____

Description of Work: _____

Building: _____

Location: _____

Type of material: ___ Surfacing ___ TSI ___ Miscellaneous (describe): _____

Location of material to be disturbed: _____

Estimated amount to be disturbed: _____ Project duration: _____

Project type: ___ O&M ___ Designed ___ Emergency ___ Special (describe): _____

To be completed by Asbestos Program Manager

Company or personnel conducting work: _____

Supervisor: _____ Accred. No. _____

Telephone No. _____

HMMB Permit No. _____

Personnel Trained for OSHA Class II type work? YES NO

Work requires OSHA Class I or II type training? YES NO

Work Practices and Procedures to be used if not a designed project:

___ HVAC off ___ negative pressure enclosure ___ wet methods ___ HEPA vacuuming ___ Protective clothing

___ glove bag ___ minienclosure ___ occupants notified ___ warning signs posted ___ waste disposal

___ wetting agents ___ encapsulant ___ labelled disposal bags ___ respirators ___ polysheets

Special Work Practices and/or equipment required: _____

Special Conditions: _____

Notification

___ Safety and Loss Control ___ Facilities Management

NOTE: An application must be submitted for all maintenance work whether or not asbestos-containing or presumed asbestos containing materials might be affected. An authorization must be received before any work is completed.

Approved to proceed:

Not Approved to proceed:

(Signature) (Date)

(Signature) (Date)

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APPENDIX G: NCDOT's Asbestos Work Permit Form (Continued) 2

Sample

TO: Asbestos Program Manager

Job Request No. 96-009

Start Date: 4-15-96

☐ ACM is present in the vicinity of the renovation and most likely will not be disturbed during the renovation

☐ ACM is present and the disturbance of asbestos may be anticipated

☒ ACM will be disturbed during the renovation

Date: 4-1-96 Division: 19 Organization/Unit: ROAD MAINTENANCE

Requester: Name: JOE CAMEL Tele. No. 919-123-4567

Description of Work: REPAIR STEAM VALVE

Building: SUNSET

Location: 555 MAPLE, OAK CITY

Type of material: ☐ Surfacing ☒ TSI ☐ Miscellaneous (describe): _____

Location of material to be disturbed: BOILER ROOM

Estimated amount to be disturbed: 4 LF Project duration: 1 DAY

Project type: ☒ O&M ☐ Designed ☐ Emergency ☐ Special (describe): _____

To be completed by Asbestos Program Manager

Company or personnel conducting work: RAPID ABATE, RALEIGH, NC

Supervisor: MARK FIBER Accred. No. _____

Telephone No. 919-123-7654

HMMB Permit No. N/A

Personnel Trained for OSHA Class II type work? ☒ YES ☐ NO

Work requires OSHA Class I or II type training? YES ☒ NO

Work Practices and Procedures to be used if not a designed project:

☒ HVAC off ☐ negative pressure enclosure ☒ wet methods ☒ HEPA vacuuming ☒ Protective clothing

☒ glove bag ☐ minienclosure ☒ occupants notified ☒ warning signs posted ☒ waste disposal

☒ wetting agents ☐ encapsulant ☒ labelled disposal bags ☒ respirators ☒ polysheets

Special Work Practices and/or equipment required: VALVE BT. OFF FLOOR - WILL NEED A LADDER; PORTABLE LIGHTS

Special Conditions: LEAKING STEAM; ROOM HOT - POTENTIAL HEAT STRESS PROBLEM

Notification

☒ Safety and Loss Control ☒ Facilities Management

NOTE: An application must be submitted for all maintenance work whether or not asbestos-containing or presumed asbestos containing materials might be affected. An authorization must be received before any work is completed.

Approved to proceed:

[Signature]
(Signature) (Date)

Not Approved to proceed:

(Signature) (Date)

Bloodborne Pathogens**SPP# 1910.1030****Quick Reference**

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1.0 Purpose

The purpose of this document is to eliminate or minimize employee occupational exposure to blood or certain other body fluids and to fully comply with the referenced OSHA Bloodborne Pathogens Standard.

2.0 Scope and Applicability

This safety policy and procedure affects all North Carolina Department of Transportation (NCDOT) employees that, as a result of performing their job duties, are “reasonably anticipated” to come into contact with bodily fluids or other contaminated sources/materials.

3.0 Reference

This safety policy and procedure is established in accordance with 29 CFR 1910.1030 of the Occupational Safety & Health Act of 1970, 29 USC 655.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. When hazards exist that cannot be eliminated, safe work

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practices, Personal Protective Equipment (PPE), and proper training regarding Bloodborne Pathogens will be implemented according to the referenced OSHA standard. This safety policy and procedure will include but is not limited to the Hepatitis B Virus (HBV) and Human Immune Deficiency Virus (HIV) which causes AIDS. NCDOT will ensure that those employees who are exposed to bloodborne diseases are provided with confidential, fair, and equal treatment.

5.0 General Responsibilities

5.1 Supervision

It is the responsibility of NCDOT to provide accurate and timely information to employees concerning exposure, identification of labels and signs, proper use of PPE, and safeguards to prevent infection. Those who supervise others within NCDOT will ensure that all affected employees receive Bloodborne Pathogen training. The course number for this training is ADM 500.

5.2 Employees

It is the responsibility of employees to identify hazards and take proper action to prevent infection through contact with bodily fluids or contaminated products. Employees are to notify their supervisors immediately when a bloodborne hazard condition is identified.

6.0 Definitions

Blood

Blood means human blood, human blood components, and products made from human blood.

Bloodborne Pathogens

Pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, Hepatitis B Virus (HBV) and Human Immune Deficiency Virus (HIV).

Bodily Fluids

Bodily fluids include but are not limited to blood, semen, vaginal fluids, saliva, vomit, amniotic fluid, or other body fluids that contain blood.

Contaminated

The presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

Decontamination

The use of chemical or physical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.

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Disinfectant

An agent that disinfects by destroying, neutralizing, or inhibiting the growth of harmful microorganisms. The most common disinfectant is a solution of at least 10 percent chlorine bleach mixed with water.

Occupational Exposure Incident

Skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious material that may result from the performance of an employee's duties.

Parenteral

Piercing mucous membranes on the skin barrier through such events as needle sticks, human bites, cuts, and abrasions.

Personal Protective Equipment (PPE)

Equipment used to prevent the spread of infectious diseases. Examples include disposable gloves, face shields, protective garments, mouth-to-mouth resuscitation devices, etc. Normal work attire is not considered to be protective clothing.

Regulated Biohazardous Waste

Liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated needles; any other wastes containing blood or potentially infectious materials.

Universal Precautions

The concept of universal precaution is to treat all blood and body fluids as if they contain infectious Bloodborne Pathogens regardless of the source. This includes avoiding contact with any human blood products, use of PPE, and immunization for the HBV virus should an occupational exposure occur.

7.0 Exposure Determination

In developing an exposure control plan, NCDOT has evaluated the work tasks associated with the functions of NCDOT to determine which tasks could be reasonably anticipated to result in exposure to Bloodborne Pathogens. NCDOT uses the following categorical distinctions to determine the level of potential exposure:

Category I:

Definition: Tasks that involve exposure to blood, body fluids, or tissues. All procedures or other job related tasks that involve an inherent potential for mucous membrane or skin contact with blood, body fluids, or tissues, or a potential for spills or splashes of them are Category I tasks.

Example: Category I tasks are those normally associated with frequent and

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repetitive handling and working directly with blood products such as those performed by physicians, nurses, Emergency Medical Technicians (EMTs), etc. These jobs by design require an almost constant exposure to the potential for infection.

NCDOT has identified no employees or job task that require this level of potential exposure to Bloodborne Pathogens.

Category II:

Definition: Tasks that involve no exposure to blood, body fluids, or tissues, but employment may require performing unplanned Category I tasks. The normal work routine involves no exposure to blood, body fluids or tissues, but exposure may be required as a condition of employment.

Example: Category II tasks are those normally associated with employees whose primary job function does not require them normally to be exposed to blood or body fluids but who are trained to respond to emergency medical situations and are distinctly identified as emergency responders by the organization. This does not include all employees who have received employer provided first aid or Cardiopulmonary Resuscitation (CPR) training, but only those specifically designated as emergency responders. Others who are trained and respond to emergencies do so as a “good Samaritan” and should also follow all universal precautions. Those employees identified in Category II tasks are offered vaccinations free of charge prior to exposure for Hepatitis B Virus should they desire. If the employee declines the vaccination, he or she is required to signify this in writing using Appendix A.

NCDOT has identified the following tasks as Category II tasks.

- First Responders - Ferry Division
- Enforcement Officers - Division of Motor Vehicles
- Bridge Unit Divers - Division of Highways
- Rest Area Custodians

Ferry Division First Responders have been identified in the Category II tasks. In an incident that could prove life threatening to a ferry passenger, immediate contact of Emergency Medical Technicians is not always practical. Therefore, First Responders in this situation may be called upon to perform Category I tasks.

Division of Motor Vehicle Enforcement Officers have been identified in the Category II tasks. In incidents on our highways such as automobile accidents, DMV Enforcement Officers may be in a response situation where Category I tasks are required. In addition, due to possible confrontational situations during an arrest, exposure potential to blood or body fluids is an elevated risk.

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Division of Highways Bridge Divers have also been identified in the Category II tasks. These divers are required to work in water bodies where the level of contamination varies. While they are not categorized as a classification that would be required to perform Category I tasks, they do have an elevated risk of acquiring the Hepatitis B Virus from possible exposure to contaminated water bodies.

Rest Area Custodians have been identified in the Category II tasks. While their normal work routines are not expected to expose them to blood, body fluids, or tissues, the potential exists for them to be exposed. Therefore, precautionary measures should be followed by these personnel in the performance of their duties.

Category III:

Definition: Tasks that involve no exposure to blood, body fluids, or tissues, and Category I tasks are not a condition of employment. The normal work routine involves no exposure to blood, body fluids, or tissues (although situations can be imagined or hypothesized under which anyone, anywhere, might encounter potential exposure to body fluids). Persons who perform these duties are not called upon as part of their employment to perform or assist in emergency medical care or first aid or to be potentially exposed in some other way.

Example: Category III tasks are those tasks associated with normal work routines where there are no direct work tasks or pre-planned emergency response actions reasonably anticipated for the employee. All Category III employees should follow universal precautions in the performance of their duties, avoiding contact with blood, body fluids, or physical items contaminated with blood or body fluids.

8.0 Engineering and Work Practice Controls

Engineering and work practice controls are to be used to eliminate or minimize the risk of employee exposure. Engineering controls and/or work practice controls are reviewed by supervisors on a regular basis not to exceed one year and any time a work task changes where the potential for occupational exposure is present. Where potential occupational exposures remain after placing engineering and work practice controls in place, PPE shall also be used.

Hand-washing facilities that are readily accessible to employees are to be provided in NCDOT facilities. Where it is not feasible to provide hand washing facilities such as on a work site, first aid kits will include an appropriate antiseptic hand cleanser or antiseptic towelettes. If an occupational exposure occurs where antiseptic hand cleansers or antiseptic towelettes are used, the employee should be transported to the nearest facility with hand washing facilities and the affected area thoroughly washed with soap and running water.

When gloves or other PPE are used and removed, employees are to wash their hands immediately after removal of the protective gear. All gloves, PPE, or clothing

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contaminated with blood or body fluid will be disposed of in sealed containers according to disposal procedures.

Equipment that may become contaminated with blood or potentially infectious materials are to be visibly examined before use and decontaminated as necessary. For example, in operations where employees share hand held equipment such as slings or bush axes where there is a possibility of blood or body fluid contamination of the equipment from open cuts, abrasions, or blisters, employees should inspect the equipment for visible signs of blood or body fluids. Where practical, work gloves are to be used by employees working with common equipment where blood or body fluids could be present. Where blood or body fluids are detected, the equipment is to be thoroughly disinfected, even if work gloves are to be worn.

9.0 Housekeeping

Supervisors will ensure that equipment, working surfaces, and floors are cleaned and decontaminated after contact with blood or other potentially infectious materials.

All bins, pails, cans, and similar receptacles that have a reasonable likelihood for becoming contaminated with blood or other potentially infectious materials are to be inspected and decontaminated on a regularly scheduled basis and cleaned and decontaminated immediately upon visual observation of blood contamination.

Examples of this are trash cans or bins in rest rooms. These receptacles are often used for blood-carrying products such as expended sharps (injection needles) and sanitary napkins.

10.0 Disposal of Contaminated Materials

All items that have been contaminated with blood or other potentially infectious materials are to be disposed of as a regulated waste. While it is not practical or economically feasible to place specially designed waste receptacles at all NCDOT facilities and work sites, this does not diminish the requirement for proper labeling, handling, and disposal of biohazardous materials. If there is waste material generated which contains or is contaminated with blood or body fluids, take the following steps:

- Do not handle in any manner contaminated items without proper PPE.
- Place all contaminated items in a sealable container being careful not to contaminate the outside of the container. If the contaminated item is sharp or likely to puncture the container, use a container that is sufficiently sturdy to prevent the puncture of the container walls.
- Label the container prominently to identify that the contents are blood and/or body fluids — a biological hazard.
- Place the container in a secure area with the label completely visible.

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- Dispose of gloves and other protective equipment in the same container. Ensure that glove outer surfaces do not touch the skin as they are removed.
- Notify your Safety Officer immediately. Your Safety Officer will make the necessary arrangement to have the waste material properly contained, labeled, and disposed of.
- Safety Officers will maintain appropriate regulated biohazardous waste containers with appropriate labeling and use these containers for the disposal of contaminated articles.
- Safety and Loss Control will ensure that contracts are maintained with licensed biohazardous waste disposers and arrangements made for the pickup and disposal of materials contained in biohazardous waste containers.

11.0 Training Requirements

All employees performing at risk tasks shall receive education about precautionary measures, epidemiology, modes of transmission, and prevention of HIV/HBV and other associated infectious agents. This training is provided at no cost to the employee and during normal work hours.

Training will be provided at the time of initial assignment to tasks where occupational exposures are “reasonably anticipated” to occur and at least annually thereafter.

A copy of the regulatory text of this standard is available for review by any employee.

NCDOT Exposure Control Plan for Bloodborne Pathogens shall be reviewed and the means by which an employee can obtain a copy of the written plan will be provided.

Training is provided regarding the location and proper use of PPE, proper work practices, and the concept of Universal Precautions as it applies to their work practices.

Training shall also include the meaning of color coding or other methods used to designate and dispose of contaminated articles or infectious waste.

Employees shall be trained in the actions to take if there is personal exposure to fluids or tissues, appropriate reporting procedures, and the medical monitoring recommended in cases of needle-stick injuries or other exposure to blood or body fluids.

Information is provided on the Hepatitis B vaccine, including information on its safety, method of administration, the benefits of being vaccinated, and that a pre-

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exposure vaccine is offered free of charge for Category I and II employees, and post-exposure vaccines free of charge for all employees who encounter an occupational exposure.

Information is provided on the post-exposure evaluation and follow-up that NCDOT provides for the employee following an exposure incident.

12.0 Safe Operating Procedures

The General Safe Operating Procedures which address conditions where an employee may be required to perform unplanned Category I tasks, necessary controls and PPE requirements shall be included to preclude exposure to blood borne pathogens. The applicable General Safety Operating Procedures located in the Workplace Safety Manual are:

- Accident and Injury Response
- First Aid
- Blood and Body Fluids, Universal Precautions

13.0 Pre-Exposure Vaccinations

Employees identified as having Category I or II work tasks will be provided at no cost the Hepatitis B vaccination. If the employee refuses the HBV vaccination, he or she must sign a Hepatitis B vaccination declination form (See Appendix A). When completed, this form must be retained indefinitely in the employee's file. If an employee has received an HBV vaccination from a previous employer, evidence of that vaccination must be obtained by the employee and placed in the employee's file.

14.0 Post-Exposure Vaccinations

Employees who report work-related exposure will be provided at no cost a Hepatitis B vaccination. If the employee refuses the HBV vaccination, he or she must sign a Hepatitis B vaccination declination form (See Appendix A). When completed, this form must be retained indefinitely in the employee's file. If an employee has received an HBV vaccination from a previous employer, evidence of that vaccination must be obtained by the employee and placed in the employee's file.

Post-exposure medical evaluation will be provided at no cost and will be performed by or under the supervision of a licensed physician. Payment for medical services is made from Safety and Loss Control's account. Contact Safety and Loss Control regarding all payment requests.

Medical counseling for any employee found, as a result of the monitoring described above, to be seropositive for HBV or HIV, will be provided at no cost. Counseling guidelines have been published by the Public Health Service. For detailed

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information, reference the Occupational Safety & Health Bloodborne Pathogen Standard 29 CFR part 1910.1030.

Following a report of an exposure incident, a confidential medical evaluation and follow-up shall be made available to the exposed employee. The medical evaluation and follow-up provided by the physician shall include the following as a minimum:

- Documentation of routes of exposure and circumstances under which the exposure occurred.
- Identification and documentation of source individual unless prohibited by law. Results of source individual testing shall be made available to the exposed employee. (If the source denies permission for testing, the local or state health director may order testing of the source if that director determines that the exposure poses a significant risk of transmission of HIV and that the source is at high risk for HIV infection.)
- Testing of the exposed employee's blood by consent.
- Post-exposure vaccination and treatment, when medically indicated, as recommended by the United States Public Health Service.
- Counseling and evaluation of reported illnesses.

NCDOT shall ensure that the physician or healthcare professional responsible for medical evaluation is provided with a copy of 29 CFR 1910.1030 (Bloodborne Pathogen Standard).

NCDOT shall provide the exposed employee with a copy of the evaluating health care professional's written opinion within 15 days of completion of the evaluation.

15.0 Recordkeeping

NCDOT shall maintain records at the Division/Unit level for each employee involved in a Category I task or for Category II and III employees who have been exposed to bloodborne pathogens for a minimum period of their employment duration plus 30 years. These records will consist of:

- Training Records that indicate the dates of the training sessions, the content of the training sessions, trainer's name and qualifications.
- Inspection reports for the areas and/or tasks where biohazardous tasks are performed, identifying conditions noted and corrective actions taken.
- Incident Investigation Reports for each incident of mucous membrane or

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parenteral exposure to body fluids or tissue, an evaluation of these conditions, and a description of corrective measures taken to prevent a recurrence or similar exposure.

- A medical record consisting of the following:

Employee name and social security number.

A copy of the employee's hepatitis B vaccination records and medical records relative to the employee's ability to receive vaccination.

A copy of all results of physical examinations, medical testing and follow-up procedures as they relate to the employee's ability to receive vaccination or to post exposure evaluation following an exposure incident.

NCDOT's copy of the physician's written opinion.

A copy of all information provided to the physician.

16.0 Confidentiality

All employee medical records shall remain confidential. No information regarding employee medical information is to be disclosed or reported to any person outside the workplace except as may be required by law.

Employee medical and training records shall be provided upon request for examination and copying to the subject employee and to anyone having the express and written consent of the employee.

Copies of medical records shall be transferred to successor employer if employees leave NCDOT employment.

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APPENDIX A: Hepatitis B Vaccine Declination

HEPATITIS B VACCINE DECLINATION

Completion of this form is mandatory for all Category I employees and for Category II and III employees who decline to receive the Hepatitis B vaccination after an exposure incident .

I fully understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring the Hepatitis B virus (HBV) infection.

I have been provided with the opportunity to be vaccinated with the Hepatitis B vaccine at no charge to myself. However, I decline the Hepatitis B vaccination at this time.

I fully understand that, by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Employee Name

Employee Signature

Social Security Number

Date

APPENDIX B: Universal Precautions

INFECTION THROUGH BLOOD AND BODILY FLUIDS

Universal Precautions will be utilized to ensure NCDOT employees are safeguarded against the spread of infectious diseases through contact with human blood or other bodily fluids. Regardless of the “perceived” risk involved, all employees should protect themselves from potential infection.

- Any accident/incident involving the transfer of blood or bodily fluids should be reported by the supervisor before shift end.
- Personal Protective Equipment (PPE) will be provided for and used by all employees considered to be at risk of infection.
- Gloves should be worn for touching blood and bodily fluids, mucous membranes or non-intact skin of all persons, for handling items or surfaces soiled with blood or bodily fluids, and for rendering assistance to injured persons. Always wash hands and arms after helping a victim.
- For those employees trained to perform CPR, separate yourself from direct contact with the victim by using a face shield or mask or one-way resuscitating device.
- Needlestick injuries should be reported to the supervisor immediately.
- Any items located that are believed to be human waste products (i.e., blood, soiled clothing, needles, or items identified with the universal biohazard symbol) should be handled only by a properly trained employee.
- All known items soiled with blood or other bodily fluids (i.e., clothing) should be disposed by a properly trained employee.
- All equipment and working surfaces shall be decontaminated with an appropriate disinfectant to eliminate the potential for infection.
- NCDOT will provide at no cost Hepatitis B vaccination series to supervisors and those employees considered to be at the greatest risk of infection.
- A post-exposure evaluation will be provided at no cost to the employee.

APPENDIX C: Biohazard Symbol

The following is a universal symbol identifying material or objects contaminated with human blood or bodily fluids. When this symbol is identified, follow all Universal Precautions in this safety policy and procedure to ensure infectious diseases are not transmitted.



Exposure to Hazardous Chemicals in Laboratories SPP# 1910.1450

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1.0 Purpose

The purpose of this safety policy and procedure is to protect North Carolina Department of Transportation (NCDOT) employees who use hazardous chemicals in laboratories.

2.0 Scope and Applicability

NCDOT laboratory employees may handle a variety of hazardous chemicals in their daily activities. Due to their frequent contact with chemicals, overexposure to chemicals may occur if the proper safeguards are not in place and if the proper precautions are not followed.

This safety policy and procedure presents a Chemical Hygiene program to protect NCDOT laboratory employees. It includes provisions for training and presents discussions on permissible exposure levels and employee exposure determination. A model Chemical Hygiene Plan that can be used by all NCDOT laboratories is also presented. Medical, hazard identification, respirator, and recordkeeping requirements are also presented.

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This document also details the areas of responsibility for managers/unit heads, supervisors, Chemical Hygiene Officers, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects all the Materials and Tests laboratories that handle hazardous chemicals. Any other laboratory within NCDOT that handles hazardous chemicals is also affected by this safety policy and procedure.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.1450).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT laboratory employees who handle hazardous chemicals will not handle such chemicals until they have been trained in NCDOT's Chemical Hygiene program. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Exposure to Hazardous Chemicals in Laboratories will be implemented. These measures will be implemented to minimize hazards in order to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Exposure to Hazardous Chemicals in Laboratories. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions and identifies specific responsibilities required by NCDOT's safety policy and procedure on Exposure to Hazardous Chemicals in Laboratories.

6.1 Definitions

Action Level

A concentration for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

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Chemical Hygiene Officer

An employee who is designated and qualified by training or experience to provide technical guidance in the implementation of provisions of the Chemical Hygiene Plan.

Chemical Hygiene Plan

A written program which sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace.

Combustible liquid

Any liquid having a flashpoint at or above 100°F (37.8 °C), but below 200°F (93.3°C) except any mixture having components with flashpoints of 200°F or higher, the total of which make up 99 percent or more of the total volume of the mixture.

Compressed Gas

- A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70°F (21.1°C).
- A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130°F (54.4°C) regardless of the pressure at 70°F (21.1°C).
- A liquid having a vapor pressure exceeding 40 psi at 100°F (37.8°C).

Explosive

A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure or high temperature.

Flammable Aerosol

An aerosol that yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening.

Flammable Gas

A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less.

Flammable Liquid

Any liquid having a flashpoint below 100°F (37.8°C), except any mixture having components with flashpoints of 100°F or higher, the total of which make up 99 percent or more of the total volume of the mixture.

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Flammable Solid

A solid, other than a blasting agent or explosive, that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard.

Flashpoint

The minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested.

Hazardous Chemical

A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees.

Laboratory

A facility where the “laboratory use of hazardous chemicals” occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory Scale

Work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person.

Laboratory-Type Hood

A device located in a laboratory, enclosed on five sides with a movable sash or fixed partial enclosed on the remaining side, constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee’s body other than hands and arms.

Laboratory Use of Hazardous Chemicals

Handling or use of such chemicals in which all of the following conditions are met:

- Chemical manipulations are carried out on a “laboratory scale”.
- Multiple chemical procedures or chemicals being used.
- The procedures involved are not part of a production process, nor in any way simulate a production process.
- Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Medical Consultation

A consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

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Oxidizer

A chemical other than a blasting agent or explosive that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

Physical Hazard

A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

Protective Laboratory Practices and Equipment

Those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Unstable (Reactive)

A chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperatures, or in contact with certain other chemicals.

Water-Reactive

A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Permissible Exposure Level
- Employee Exposure Determination
- Chemical Hygiene Plan
- Medical Requirements
- Hazard Identification
- Respirators
- Recordkeeping

6.2.1 Training

Employees who handle hazardous chemicals in laboratories will be trained in:

- Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc)

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- The physical and health hazards of chemicals in the work area
- The measures employees can take to protect themselves from these hazards, including specific procedures the employee can take to protect themselves from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used

Additionally, affected employees will be trained on applicable details of NCDOT's written Chemical Hygiene Plan.

Employees must also be informed of:

- The location and availability of their laboratory's Chemical Hygiene Plan
- The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard
- Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory
- The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Material Safety Data Sheets received from the chemical supplier

Employees shall be trained at the time of initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations. The frequency of refresher information and training shall be at the discretion of the supervisor.

6.2.2 Permissible Exposure Levels

Employees' exposures to any of hazardous chemicals shall not exceed the permissible exposure level as specified in OSHA's Z tables.

6.2.3 Employee Exposure Determination

Employee exposure monitoring will consist of initial and periodic monitoring.

Initial monitoring will be conducted if there is suspicion that the exposure levels for a particular substance regularly exceeds the action (or in the absence of an action level, the PEL).

Periodic monitoring shall be conducted if the initial monitoring discloses employee exposure over the action level. The frequency of periodic monitoring will be based on the OSHA Z tables requirements for the subject substance.

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6.2.4 Chemical Hygiene Plan

A chemical hygiene plan must be in place for all laboratories that use and handle hazardous chemicals. Appendix A presents a model chemical hygiene plan that can be used by any NCDOT laboratory. The goals of a chemical hygiene plan are to:

- Protect employees from health hazards associated with hazardous chemicals in that laboratory
- Keep exposures below the limits specified in the OSHA Z tables

This Chemical Hygiene Plan will be available to employees and it shall include each of the following elements:

- Standard operating procedures to be followed when laboratory work involves the use of hazardous chemicals
- Criteria to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices
- A requirement that fume hoods and other protective equipment need to be functioning properly
- Provisions for employee information and training
- The circumstances under which a particular laboratory operation, procedure or activity shall require prior approval from Safety and Loss Control
- Provisions for medical consultation and medical examinations
- Designation of a Chemical Hygiene Officer
- Provisions for additional employee protection for work with particularly hazardous substances. These include select carcinogens, reproductive toxins and substances which have a high degree of acute toxicity. Special consideration shall be given to the following provisions which shall be included where appropriate:
 - Establishment of a designated area
 - Use of containment devices such as fume hoods or glove boxes
 - Procedures for safe removal of contaminated waste
 - Decontamination procedures

The Chemical Hygiene Plan shall be reviewed and evaluated at least annually and updated as necessary.

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6.2.5 Medical Requirements

Employees who work with hazardous chemicals will be provided an opportunity to receive medical examinations and/or consultation including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:

- Whenever an employee develops signs or symptoms associated with an exposure to hazardous chemicals in the laboratory
- Where exposure monitoring reveals an exposure level routinely above the action levels (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements
- Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure

All medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place.

The following information shall be provided to the physician:

- The identity of the hazardous chemical(s) to which the employee may have been exposed
- A description of the conditions under which the employee was exposed to chemicals
- A description of the signs and symptoms of exposure that the employee is experiencing

Upon completion of the medical examination or consultation, the NCDOT laboratory shall obtain a written opinion from the examining physician which shall include the following:

- Any recommendation for further medical follow-up
- The results of the medical examination and any associated tests
- Any medical condition which may be revealed in the course of the examination which may place the employee at increased risk as a result of exposure to a hazardous workplace
- A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment

The written opinion shall not reveal specific findings of diagnoses unrelated to occupational exposure. See [SPP# 1910.20](#), [Access to Medical Records](#) for related information.

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6.2.6 Hazard Identification

Labels on incoming containers of hazardous chemicals must not be removed or defaced.

Additionally, material safety data sheets (MSDS) that are received with incoming shipments of hazardous chemicals must be readily accessible to laboratory employees.

6.2.7 Respirators

If respirators are required to maintain exposures below the PEL, they shall be selected and used per NCDOT's Respiratory Program and [SPP# 1910.134, Respiratory Protection](#).

6.2.8 Recordkeeping

Accurate records of employee exposures and any medical consultation and examination shall be maintained in the employee's file.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of laboratory equipment and supplies to ensure compliance with this safety policy and procedure. They will be also responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will designate a Chemical Hygiene Officer to oversee implementation of their facility's Chemical Hygiene Plan.

Managers/Unit Heads will also ensure compliance with safety policy and procedure through their auditing process.

6.3.2 Laboratory Supervisors

Laboratory supervisors will ensure that laboratory employees follow safe laboratory work practices as outlined in NCDOT's model Chemical Hygiene Plan. The laboratory supervisor will provide laboratory employees information and training about the hazards of chemicals in their work area. Additionally, laboratory supervisors will ensure that laboratory employees are provided with PPE as necessary for their job.

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Laboratory supervisors will ensure that all chemical containers are labeled and that Material Safety Data Sheets (MSDS) are readily accessible for the hazardous chemicals in their laboratory.

6.3.3 Laboratory Employees

Laboratory employees shall comply with all applicable guidelines contained in this safety policy and procedure. They will also report any hazardous or unsafe condition immediately to their supervisor.

6.3.4 Chemical Hygiene Officer

The Chemical Hygiene Officer will ensure that the Chemical Hygiene Plan is kept up to date. He or she is also responsible for maintaining monitoring records and providing technical support to managers/unit heads, laboratory supervisors and employees.

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors or others as applicable on any matter concerning this safety policy and procedure. Additionally, Safety and Loss Control will assist in the developing or securing of required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

SAFETY POLICY & PROCEDURE

APPENDIX A: Model NCDOT Chemical Hygiene Plan

Chemical Hygiene Plan

for

Laboratory _____

Division/Unit _____

Location _____

Date _____

Chemical Hygiene Officer

Name

Title

Telephone Number

Mailing Address

This Chemical Hygiene Plan includes the following components :

- Basic Rules and Procedures for Laboratory work with Chemicals
- Chemical Procurement, Distribution, and Storage
- Housekeeping, Maintenance, and Inspections
- Medical Program
- Protective Apparel and Equipment
- Records
- Signs and Labels
- Spills and Accidents
- Training and Information Program
- Waste Disposal

Basic Rules and Procedures for Laboratory Work with Chemicals

Accident and Spills

Eye Contact :

Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention.

Ingestion:

Encourage the victim to drink large amounts of water unless the MSDS advises otherwise.

Skin Contacts:

Promptly flush the affected area with water and remove any contaminated clothing. If symptoms persist after washing, seek medical attention.

Clean-up:

Promptly clean up spills, using appropriate protective apparel and equipment and proper disposal.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 2

Basic Rules and Procedures for Laboratory Work with Chemicals (Continued)

Avoidance of “routine” exposure

Develop and encourage safe habits. Avoid unnecessary exposure to chemicals by any route. Do not smell or taste chemicals. Vent apparatus which may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices.

Inspect gloves and test glove boxes before use. Do not allow release of toxic substances in cold rooms and warm rooms, since these have contained recirculated atmospheres.

Choice of chemicals

Use only those chemicals for which the design of the available ventilation system is appropriate.

Eating, smoking, etc.

Avoid eating, drinking, smoking, gum chewing, or application of cosmetics in areas where laboratory chemicals are present. Wash hands before conducting these activities.

Avoid storage, handling, or consumption of food or beverages in storage areas, refrigerators, or in glassware or utensils which are also used for laboratory operations.

Equipment and glassware

Handle and store laboratory glassware with care to avoid damage. Do not use damaged glassware. Use extra care with Dewar flasks and other evacuated glass apparatus. Shield or wrap them to contain chemicals and fragments should implosion occur. Use equipment only for its designed purpose.

Exiting

Wash areas of exposed skin well before leaving the laboratory.

Horseplay

Avoid practical jokes or other behavior which might confuse, startle or distract another worker.

Mouth suction

Do not use mouth suction for pipetting or starting a siphon.

Personal apparel

Confine long hair and loose clothing. Wear shoes at all times in the laboratory but do not wear sandals, perforated shoes, or sneakers.

Personal housekeeping

Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored. Clean up the work area on completion of an operation or at the end of each day.

Personal protection

Assure that appropriate eye protection is worn by all persons, including visitors, where chemicals are stored or handled. Use IR - UV protective eyewear for loading and unloading the muffle furnace.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 3

Basic Rules and Procedures for Laboratory Work with Chemicals (Continued)

Personal protection (Continued)

Wear appropriate gloves when the potential for contact with toxic materials exists. Inspect the gloves before each use. Wash them before removal, and replace them periodically.

Use appropriate respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls or inspecting the respirator before use.

Use any other protective and emergency apparel and equipment as appropriate.

Avoid use of contact lenses in the laboratory unless necessary. If they are used, inform supervisor so special precautions can be taken. Remove laboratory coats immediately on significant contamination.

Planning

Seek information and advice about hazards, plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation.

Unattended operations

Leave lights on, place an appropriate sign on the door, and provide for containment of toxic substances in the event of failure of a utility service (such as cooling water) to an unattended operation.

Use of hood

Use the hood for operations which might result in release of toxic chemical vapors or dust.

As a rule of thumb, use a hood or other local ventilation device when working with any appreciably volatile substance with TLV of less than 50 PPM.

Confirm adequate hood performance before use; keep hood closed at all times except when adjustments within the hood are being made, keep materials stored in hoods to a minimum and do not allow them to block vents or air flow. Leave the hood “on” when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is “off.”

Vigilance

Be alert to unsafe conditions and see that they are corrected when detected.

Waste disposal

Assure that the plan for each laboratory operation includes plans and training for waste disposal. Deposit chemical waste in appropriately labeled receptacles and follow all other waste disposal procedures of the Chemical Hygiene Plan.

Do not discharge to the sewer concentrate acids or bases, highly toxic, malodorous, or lachrymatory substances or any substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage, or obstruct flow.

Working alone

Avoid working alone in a building, do not work alone in a laboratory if the procedures being conducted are hazardous.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 4

Chemical Procurement, Distribution, and Storage

Procurement

Yes No

- ☐ ☐ Is information available to employees on proper handling, storage, and disposal on substances when they are received?
If not, list the measures to ensure information will be made available to employees.

No containers should be accepted without adequate identifying labels.

Stockrooms/Storerooms

Yes No

- ☐ ☐ Are toxic substances segregated in well-identified areas with local exhaust ventilation?
☐ ☐ Are highly toxic chemicals whose containers have been opened in unbreakable secondary containers?

Stored chemicals should be examined at least annually for replacement, deterioration, and container integrity. Additionally, stockrooms/storerooms should not be used as preparation or repacking areas.

Distribution

When chemicals are hand carried, the container should be placed in an outside container or bucket. Freight-only elevators should be used if possible.

Laboratory Storage

Yes No

- ☐ ☐ Are chemicals that are stored in the laboratory in small as possible quantities?
☐ ☐ Are periodic inventories conducted with unneeded items discarded or returned to the stockroom/storeroom?

If laboratory storage is permitted, do not store chemicals on bench tops and in hoods. Also, exposure to heat or direct sunlight should be avoided.

Environmental Monitoring

Yes No

- ☐ ☐ Is a highly toxic substance stored or used 3 times a week or more?
☐ ☐ Are the laboratory hoods or other ventilation devices being tested or redesigned?

If any of the environmental monitoring questions were unanswered “yes,” monitoring of airborne concentrations may be required.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 5

Housekeeping, Maintenance, and Inspections

Cleaning

Floors should be cleaned regularly.

Inspections

Yes No

- ☐ ☐ Are formal housekeeping and chemical hygiene inspections conducted quarterly (laboratories with frequent personnel changes) or semiannually?

Informal housekeeping inspections shall be performed continually.

Maintenance

Yes No

- ☐ ☐ Are eye wash fountains inspected every 3 months?
- ☐ ☐ Are respirators routinely inspected by the laboratory supervisor?
- ☐ ☐ Are procedures in place to prevent the start-up of out-of-service equipment?

All other safety equipment should be regularly inspected.

Passageways

Yes No

- ☐ ☐ Are all accesses to exits, emergency equipment, and utility controls not blocked?

Stairways and hallways should not be used as storage areas.

Medical Program

Routine Surveillance

Yes No

- ☐ ☐ Are any employees regularly and frequently handling toxicologically significant quantities of a chemical? If yes, those employees should consult a qualified physician to determine whether a regular schedule of medical surveillance is required?

First Aid

Employees trained in first aid should be available during all working hours.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 6

Protective Apparel and Equipment

Yes No

- ☐ ☐ Is protective clothing available and compatible with the degree of required protection for the substances being handled?

Are these items in place?

Yes No

- ☐ ☐ Early accessible drench-type safety shower?
- ☐ ☐ An eyewash fountain?
- ☐ ☐ A fire extinguisher?
-
- ☐ ☐ Is respiratory protection available?
- ☐ ☐ Are a fire alarm and emergency phone nearby?

Records

Accident records should be written and maintained. These records are maintained by _____ and kept at _____(location).

Yes No

- ☐ ☐ Are high risk substances used at this laboratory? If so, document the inventory and usage of these substances.

Signs and Labels

The following signs and labels should be posted in this laboratory:

- Emergency telephone numbers of emergency personnel/facilities, supervisors, and laboratory workers
- Identity labels, showing contents of containers (including waste receptacles) and associated hazards
- Location signs for safety showers, eyewash stations, other safety and first aid equipment, exits and areas where food and beverage consumption and storage are permitted
- Warnings at areas or equipment where special or unusual hazards exist

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 7

Spills and Accidents

Yes No

- ☐ ☐ Is a written emergency plan in place (See [SPP # 1910.38](#))? It should include procedures for ventilation failure, medical care, and drills.
- ☐ ☐ Is alarm system in place and operable in all parts of the laboratory facility?
- ☐ ☐ Does it include prevention, containment, cleanup, and reporting provisions?

Training and Information Program

Yes No

- ☐ ☐ Are all employees informed about the work in the laboratory, its risks, and what to do if an accident occurs?

Emergency and Personal Protection

Yes No

- ☐ ☐ Do employees know the location and use of available protective clothing and equipment?
- ☐ ☐ Are some of the employees trained in the proper use of the emergency equipment procedures?
- ☐ ☐ Do the stockroom/storeroom employees know about the hazards and compatible protective clothing associated with the chemical substances they handle?

Literature/Consultation

Yes No

- ☐ ☐ Are literature and consulting advice concerning chemical hygiene available to laboratory employees?

Waste Disposal

Content

The waste disposal program should specify how waste is to be collected, segregated, stored, and transported and include consideration of what materials can be incinerated. Transport from the institution must be in accordance with DOT regulations.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 8

Waste Disposal (Continued)

Discarding Chemical Stocks

Unlabeled containers of chemicals and solutions should undergo prompt disposal; if partially used, they should not be opened. Before an employee's employment in the laboratory ends, chemicals for which that person was responsible should be discarded or returned to storage.

Frequency of Disposal

Waste should be removed from laboratories to a central waste storage area at least once per week and from the central waste storage area at regular intervals.

Method of Disposal

Incineration in an environmentally acceptable manner is the most practical disposal method for combustible laboratory waste.

Indiscriminate disposal by pouring waste chemicals down the drain or adding them to mixed refuse for landfill burial is unacceptable.

Hood should not be used as a means of disposal for volatile chemicals

Disposal by recycling or chemical decontamination should be used when possible.

Hazard Communication

SPP # 1910.1200

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1.0 Purpose

The purpose of this safety policy and procedure is to establish a program to protect North Carolina Department of Transportation (NCDOT) employees who are exposed to hazardous chemicals during the performance of their job duties.

2.0 Scope and Applicability

NCDOT purchases, stores, and uses a variety of chemicals in its everyday operations. Employees who handle chemicals must be aware of the hazards associated with those chemicals in order to protect themselves from injury.

This safety policy and procedure provides a hazard communication program template and the associated background information that can be used by any NCDOT facility or worksite to protect employees from chemical hazards. It includes provisions for training, discussion of chemical hazards, and discussion on the importance and structure of the material safety data sheet (MSDS). Also, it presents information on NCDOT's MSDS fax system, labeling requirements of the hazard communication standard and NCDOT's Hazard Communication Program.

SAFETY POLICY & PROCEDURE

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, Purchasing, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects all NCDOT employees who are exposed to chemical hazards during the performance of their job duties.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.1200) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.59).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, employees will not handle hazardous chemicals until they have been trained in NCDOT's hazard communication program. When chemical hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Hazard Communication will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Hazard Communication. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined under Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Hazard Communication.

6.1 Definitions

Chemical Manufacturer

A manufacturing facility classified in Standard Industrial Classification (SIC) Codes 20 through 39 where chemicals are produced for use and distribution.

SAFETY POLICY & PROCEDURE

Chemical Name

Refers to the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.

Common Name

Any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

Distributor

Any business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to purchasers.

Facility

One or more establishments or buildings located at one contiguous site in North Carolina.

Hazardous Chemical

Any element, chemical compound, or mixture of elements and/or compounds which is a physical or health hazard.

Label

Any written, printed, or graphic material displayed or affixed to containers of Hazardous Chemicals.

Material Safety Data Sheet

MSDS mean chemical information sheets drawn up in conformity with hazardous chemical standards.

Storage or Container

Will have the ordinary meaning; however, it does not include pipes used in the transfer of substances or the fuel tanks of self-propelled internal combustion vehicles.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Chemical Hazards
- Material Safety Data Sheets
- Obtaining Material Safety Data Sheets
- Labels and Labeling
- NCDOT Hazard Communication Program

SAFETY POLICY & PROCEDURE

6.2.1 Training

Employees will be trained to work safely with chemicals. Training will include:

- The Hazard Communication standard and its requirements
- Operations in the work area where hazardous chemicals are present
- The location and availability of the written hazard communication program
- Physical and health hazards of the chemicals in the work areas
- Measures employees can take to protect themselves
- Methods and observations to detect the presence of a hazardous chemical
- NCDOT's specific procedures to provide engineering controls, work practices, and Personal Protective Equipment (PPE)
- How to read and interpret information on labels and MSDS

Employees will be trained at the time of initial employment or assignment as well as whenever a new hazard is introduced into their workplace. Refresher training shall be provided annually.

All training will be documented. See Appendix A for the training documentation form that is part of the Hazard Communication Program package. A copy of the training documentation shall be placed in the employee's personnel record file.

6.2.2 Chemical Hazards

A hazardous chemical is any chemical that is a physical or health hazard. Physical hazards produce a dangerous situation outside the body. Health hazards can cause health damage either immediately from short term (acute) exposure or slowly through long-term exposure (chronic).

Exposures to these chemical hazards can occur through inhalation (breathing dust, vapors, or mists), ingestion (eating or smoking while working around hazardous chemicals), or absorption (chemicals entering the body through cuts, scratches, or broken skin).

The common types of hazardous chemicals found in NCDOT include but are not limited to:

- | | |
|---------------------|----------------------|
| • Acids | • Dusts |
| • Adhesives | • Flammables |
| • Caustics | • Glues |
| • Cleaning agents | • Greases |
| • Degreasing agents | • Petroleum products |

SAFETY POLICY & PROCEDURE

- Inks
- Lacquers
- Paints
- Pesticides
- Sealers
- Solders
- Strippers
- Thinners
- Wood preservatives

6.2.3 Material Safety Data Sheets (MSDSs)

The material safety data sheets (MSDS) are fact sheets for hazardous chemicals provided by the chemical manufacturer. They must be available for every hazardous chemical in the work area and must contain information about the chemical including:

- Chemical product and company identification
- Composition, information or ingredients
- Hazard identification
- First aid measures
- Fire-fighting measures
- Accidental release measures
- Handling and storage
- Exposure controls and personal protection
- Physical and chemical properties
- Stability and reactivity
- Toxicological information
- Ecological (environmental) information
- Disposal considerations
- Transport information

Appendix B presents a sample 10 part MSDS for gasoline. Newer MSDS s may have 16 parts based upon the the ANSI standardized MSDS format.

6.2.4 Obtaining MSDS Sheets

MSDS sheets can be obtained from:

- NCDOT's MSDS fax system
- New chemical product purchases

NCDOT's MSDS fax system uses a third party provider who faxes MSDSs upon request. The user simply dials the appropriate telephone number, provides the necessary information, and within minutes a MSDS fax is transmitted to the designated receiving fax machine. See Appendix C for NCDOT's MSDS fax request form.

The advantage of this method is that worksites and work locations do not necessarily have to maintain paper copies of MSDSs. Rather, the availability and assessibility of MSDSs is determined by need.

MSDS fax requests fall into two categories:

- Routine
- Emergency

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For routine requests, employees should complete and submit the NCDOT MSDS Fax request form to their immediate supervisor. For emergency requests, any employee can call 1-(800) 451-8346 without completing and submitting a NCDOT MSDS Fax request form. If problems are encountered while obtaining a MSDS, contact the Central Equipment Unit.

New chemical product purchases should result in the MSDS being retained for initial review of the hazards associated with the chemical. However, a copy of the subject MSDS should be forwarded to the Central Equipment Unit as soon the chemical is purchased.

6.2.5 Labels and Labeling

Warning labels should alert employees that a chemical is dangerous and identify the hazards of the chemical. Labels are required on:

- All containers of hazardous material in the workplace
- All containers of hazardous material being shipped from one workplace to another

For example, containers used for gasoline, kerosene, or cleaning agents must be labeled. These labels must be prominently displayed and contain:

- Identity of the chemical
- Appropriate hazard warnings (physical and health)
- Chemical manufacturer's name and address

On stationary containers, signs or placards may be used in place of the labels. Also portable transfer containers are not required to be labeled unless that portable container is transferred for use on another workshift. These labels should never be defaced or removed from these containers.

6.2.6 NCDOT's Hazard Communication Program

Appendix A presents NCDOT's Hazard Communication Program that can be used by any facility, worksite, work unit, or work location in NCDOT.

NCDOT's Hazard Communication Program includes:

- Facility or worksite identification
- Program element contact list
- Chemical list
- Container labeling provisions
- MSDS requirements and availability
- Non-routine tasks hazard awareness provisions
- Hazard communication provisions for contractors
- Employee training documentation

SAFETY POLICY & PROCEDURE

Each facility or worksite with a hazard communication program should have a hazard communication program coordinator to oversee all the program elements. Additionally, all employees should know the location and availability of their hazard communication program.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of equipment and supplies for successful implementation and maintenance of NCDOT's Hazard Communication Program in their work areas. They will be also responsible for appointing a Hazard Communication Coordinator for their work area(s) and for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that labels on hazardous chemicals are legible. They shall also provide refresher training to employees on NCDOT's Hazard Communication Program.

Supervisors will ensure that employees are provided with and instructed on the use of any PPE when working with hazardous chemicals.

6.3.3 Employees

Employees will be trained before working with any hazardous chemicals. They are responsible for reviewing chemical labels for procedures and hazards before using any hazardous chemicals.

Employees shall wear the necessary PPE before working with any hazardous chemical. Also, employees shall report any unlabeled or defaced hazardous chemical containers to their immediate supervisor.

6.3.4 Hazard Communication Coordinators

Hazard Communication Coordinators will be responsible for coordinating all the program elements associated with NCDOT's Hazard Communication Program. They will also be responsible for submitting a chemical list to the Central Equipment Unit in January of each year.

They will maintain records of employee training separate from the training documentation kept in the employee's personnel file.

SAFETY POLICY & PROCEDURE

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.6 Purchasing

When a requisition is coded for purchase, a copy of this request will be sent to Safety and Loss Control (this will indicate how much and what was purchased). This will allow Safety and Loss Control to perform a safety review of the chemical purchase to ensure that its intended use is appropriate and acceptable.

Purchasing will also ensure that, when a hazardous chemical is ordered, a MSDS will be sent to Safety and Loss Control at least 10 days prior to shipping.

6.3.7 Central Equipment Unit

Central Equipment Unit shall retain a copy of all MSDS that arrive with chemical purchases. Additionally, the Central Equipment Unit will be responsible for administering the NCDOT MSDS fax system and also for maintaining a MSDS copy of all hazardous chemicals used in NCDOT.

SAFETY POLICY & PROCEDURE

APPENDIX A: NCDOT Hazard Communication Program

Hazard Communication Program for:

Facility (Worksite): _____

Location: _____

Division/Unit: _____

Date: _____

Program Element

Contact Person

Program Coordinator

Chemical Inventory

Container Labeling

Employee Training

Personal Protective Equipment

Emergency Response

Hazards of Non-Routine Tasks

Hazard Communication Posting

Contractor Communication

APPENDIX A: NCDOT Hazard Communication Program (Continued) 2

Chemical List

All facilities or worksites that manufacture, process, use, store, or produce hazardous chemicals shall compile and maintain a Chemical List. This list will contain the chemical name or the common name used on the MSDS or container label.

The Chemical List will be updated annually in January of each year and submitted to the Central Equipment Unit. The Chemical List will be prepared at the facility or worksite where the chemicals are stored and used.

Labels and Labeling System

Labeling systems or schemes that meets the requirements of section 6.2.5 of this safety policy and procedure are acceptable.

Material Safety Data Sheets (MSDS)

MSDS information should be posted on the prevalent chemicals used at a facility or worksite. Employees who are working with a hazardous chemical may request a fax copy of the MSDS from their immediate supervisor by submitting a routine fax request. In emergencies, employees can directly submit a fax request. If problems are encountered while obtaining a MSDS, contact the Central Equipment Unit.

Emergency Response

Any incident of over exposure or spill of a hazardous chemical shall be reported immediately to _____ (Emergency Response Coordinator). The immediate supervisor shall ensure that the proper emergency response actions are taken in leak/spill situations.

Hazards of Non-Routine Tasks

Supervisors will inform employees of any special tasks that may involve possible exposure to hazardous chemicals. Safe work practices, use of required PPE, and standard operating procedures (SOPs) shall be reviewed prior to the start of such tasks.

APPENDIX A: NCDOT Hazard Communication Program (Continued) 3

Contractor Communication

All onsite contractors (and subcontractors) are responsible for adhering to NCDOT's Hazard Communication Program while they are on NCDOT worksites. Information on hazardous chemicals known to be used on the worksite will be exchanged with contractors.

Contractors are required to exchange MSDS information with NCDOT personnel as requested. Additionally, all onsite contractors shall be provided a copy of NCDOT's Hazard Communication Program. Contractors will be responsible for providing necessary information to their employees and subcontractors.

SAFETY POLICY & PROCEDURE

APPENDIX A: NCDOT Hazard Communication Program (continued) 4

Employee Training

Date: _____ **Location:** _____
Instructor: _____ **Title:** _____

Program Elements to be Reviewed

- ☐ The Hazard Communication standard and its requirements
- ☐ Operations in work area where hazardous chemicals are present
- ☐ The location and availability of the written Hazard Communication program
- ☐ Physical and health hazards of the chemicals in the work areas
- ☐ Measures employees can take to protect themselves
- ☐ Methods and observations to detect the presence of a hazardous chemical
- ☐ NCDOT's specific procedures to provide engineering controls, work practices, and PPE
- ☐ How to read and interpret information on labels and MSDS

Employees Trained

Name	Job Title	SSN	Signature
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Instructor's Signature: _____

SAFETY POLICY & PROCEDURE

APPENDIX B: Sample MSDS for Gasoline (Continued) 2

EXPOSURE LIMIT FOR TOTAL PRODUCT
100 ppm (300 mg/m³) for an 8-hour
workday

BASIS

Recommended by Exxon. OSHA Regulation
29 CFR 1910.1000 and the American
Conference of Governmental Industrial
Hygienists (ACGIH) list Threshold Limit
Values (TLV) of 300 ppm (900 mg/m³) for
gasoline for an 8-hour workday; 500 ppm
(1500 mg/m³) STEL.

50 ppm (187 mg/m³) for toluene
(skin) for an 8-hour workday

Recommended by the American Conference
of Governmental Industrial Hygienists
(ACGIH)

The airborne benzene level shall
not exceed 1 ppm for an 8-hour
workday; 5 ppm STEL

OSHA Regulation 29 CFR 1910.1028

C. PRIMARY ROUTES OF ENTRY AND EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT

If splashed into the eyes, flush with clear water for 15 minutes or until irritation
subsides. If irritation persists, call a physician.

SKIN

In case of skin contact, remove any contaminated clothing and wash skin with soap and water.
Launder or dry-clean clothing before reuse. If product is injected into or under the skin, or
into any part of the body, regardless of the appearance of the wound or its size, the individual
should be evaluated immediately by a physician as a surgical emergency. Even though initial
symptoms from high pressure injection may be minimal or absent, early surgical treatment within
the first few hours may significantly reduce the ultimate extent of injury.

INHALATION

If overcome by vapor, remove from exposure and call a physician immediately. If breathing is
irregular or has stopped, start resuscitation, administer oxygen, if available.

INGESTION

If ingested, DO NOT induce vomiting; call a physician immediately.

D. FIRE AND EXPLOSION HAZARD INFORMATION

UNUSUAL FIRE AND EXPLOSION HAZARD

EXTREMELY FLAMMABLE VAPORS CAN TRAVEL AND EXPLODE

FLASH POINT (MINIMUM)

EXTREMELY FLAMMABLE - Per DOT 49 CFR 173.115
Approximately -38°C (-36°F)

AUTOIGNITION TEMPERATURE

Approximately 456°C (853°F)
National Fire Protection Association's
Guide on Hazardous Materials

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION

Health Flammability Reactivity
1 3 0

BASIS

Recommended by the National Fire Protection Association

HANDLING PRECAUTIONS

This liquid is volatile and gives off invisible vapors. Either the liquid or vapor may settle
in low areas or travel some distance along the ground or surface to ignition sources where they
may ignite or explode.

Keep product away from ignition sources, such as heat, sparks, pilot lights, static electricity,
and open flames.

FLAMMABLE OR EXPLOSIVE LIMITS (APPROXIMATE PERCENT BY VOLUME IN AIR)

Estimated values: Lower Flammable Limit 1.4% Upper Flammable Limit 7.6%

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EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES

Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires involving this type of product, depending on size or potential size of fire and circumstances related to the situation. Plan fire protection and response strategy through consultation with local fire protection authorities or appropriate specialists.

The following procedures for this type of product are based on the recommendations in the National Fire Protection Association's "Fire Protection Guide on Hazardous Materials", Eighth Edition (1984):

Use dry chemical, foam or carbon dioxide to extinguish the fire. Water may be ineffective, but water should be used to keep fire-exposed containers cool. If a leak or spill has ignited, use water spray to disperse the vapors and to protect men attempting to stop a leak. Water spray may be used to flush spills away from exposures. Minimize breathing of gases, vapor, fumes or decomposition products. Use supplied-air breathing equipment for enclosed or confined spaces or as otherwise needed.

NOTE: The inclusion of the phrase "water may be ineffective" is to indicate that although water can be used to cool and protect exposed material, water may not extinguish the fire unless used under favorable conditions by experienced fire fighters trained in fighting all types of flammable liquid fires.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS

Fumes, smoke, carbon monoxide, aldehydes and other decomposition products, in the case of incomplete combustion.

"EMPTY" CONTAINER WARNING

"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated operations.

E. HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS

Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure)

High vapor concentrations (greater than approximately 1000 ppm) are irritating to the eyes and the respiratory tract, and may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness, and other central nervous system effects, including death.

Prolonged or repeated liquid contact with the skin will dry and defat the skin, leading to possible irritation and dermatitis.

NATURE OF HAZARD AND TOXICITY INFORMATION

Prolonged or repeated skin contact with this product tends to remove skin oils, possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Product contacting the eyes may cause eye irritation.

This product may contain up to a maximum of 4.9 weight percent benzene, CAS # 71-43-2, as a natural constituent of various gasoline blend components. Benzene can cause anemia and other blood diseases, including leukemia (cancer of the blood-forming system), after prolonged or repeated exposures at high concentrations (e.g., 50-500 ppm). It has also caused fetal defects in tests on laboratory animals.

Contains light hydrocarbon components. Lifetime studies by the American

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Petroleum Institute have shown that kidney damage and kidney cancer can occur in male rats after prolonged inhalation exposures at elevated concentrations of total gasoline. Kidneys of mice and female rats were unaffected. The U.S. EPA Risk Assessment Forum has concluded that the male rat kidney tumor results are not relevant for humans. Total gasoline exposure also produced liver tumors in female mice only. The implication of these data for humans has not been determined. Certain components, such as normal hexane, may also affect the nervous system at high concentrations (e.g., 1000-1500 ppm).

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5 g/kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

Inhalation of components of exhaust from burning, such as carbon monoxide, may cause death at high concentrations. Exposure to the exhaust of this fuel should be minimized.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE

Benzene - Individuals with liver disease may be more susceptible to toxic effects.

Hexane - Individuals with neurological disease should avoid exposure.

Petroleum Solvents/Petroleum Hydrocarbons - Skin contact may aggravate an existing dermatitis.

F. PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE

Approximately 21°C (70°F) IBP
to 227°C (440°F) FBP

VAPOR PRESSURE

Varies seasonally from approximately
5 to 15 psi Reid Vapor Pressure

SPECIFIC GRAVITY (15.6 C/15.6 C)

Approximately 0.74

VAPOR DENSITY (AIR = 1)

Approximately 5

MOLECULAR WEIGHT

Complex mixture, components vary
from approximately 45 to 185

PERCENT VOLATILE BY VOLUME

100

pH

Essentially neutral

EVAPORATION RATE @ 1 ATM. AND 25 C (77 F)

(n-BUTYL ACETATE = 1)
Approximately 10-11

POUR, CONGEALING OR MELTING POINT

Less than -38°C (-36 F)
Pour Point by ASTM D 97

SOLUBILITY IN WATER @ 1 ATM. AND 25 C (77 F)

Negligible; less than 0.1%

VISCOSITY

Approximately 0.5 cSt @ 25°C

G. REACTIVITY

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc., as this presents a serious explosion hazard.

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H. ENVIRONMENTAL INFORMATION

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Shut off and eliminate all ignition sources. Keep people away. Recover free product. Add sand, earth or other suitable absorbent to spill area. Minimize breathing vapors. Minimize skin contact. Ventilate confined spaces. Open all windows and doors. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas. Assure conformity with applicable governmental regulations. Continue to observe precautions for volatile, flammable vapors from absorbed material.

THE FOLLOWING INFORMATION MAY BE USEFUL IN COMPLYING WITH VARIOUS STATE AND FEDERAL LAWS AND REGULATIONS UNDER VARIOUS ENVIRONMENTAL STATUTES:

REPORTABLE QUANTITY (RQ), EPA REGULATION 40 CFR 302 (CERCLA Section 102)

The RQ for:

Benzene is 10 lbs. This product may contain up to 4.9% benzene.
Cumene is 5,000 lbs. This product may contain up to 1% cumene.
Cyclohexane is 1,000 lbs. This product may contain up to 1% cyclohexane.
Ethylbenzene is 1,000 lbs. This product may contain up to 3% ethylbenzene.
Methyl-tertiary-butyl ether is 1 lb. This product may contain up to 15% methyl-tertiary-butyl ether.
Naphthalene is 100 lbs. This product may contain up to 1% naphthalene.
Toluene is 1,000 lbs. This product may contain up to 20% toluene.
Xylene is 1,000 lbs. This product may contain up to 10% xylene.

THRESHOLD PLANNING QUANTITY (TPQ), EPA REGULATION 40 CFR 355 (SARA Sections 301-304)

No TPQ for product or any constituent greater than 1% or 0.1% (carcinogen).

TOXIC CHEMICAL RELEASE REPORTING, EPA REGULATION 40 CFR 372 (SARA Section 313)

This product may contain:

Up to 4.9% benzene.
Up to 1% cumene.
Up to 1% cyclohexane.
Up to 3% ethylbenzene.
Up to 15% methyl-tertiary-butyl ether.
Up to 1% naphthalene.
Up to 20% toluene.
Up to 10% xylene.

HAZARDOUS CHEMICAL REPORTING, EPA REGULATION 40 CFR 370 (SARA Sections 311-312)

	Acute	Chronic	Fire	Pressure	Reactive	
EPA HAZARD CLASSIFICATION CODE:	Hazard	Hazard	Hazard	Hazard	Hazard	Not Applicable
	XXX	XXX	XXX			

I. PROTECTION AND PRECAUTIONS

VENTILATION

Use only with ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. No smoking, flame or other ignition sources.

RESPIRATORY PROTECTION

Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES

Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION

Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT

Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing, which could result in prolonged or repeated skin contact.

WORK PRACTICES / ENGINEERING CONTROLS

Keep containers closed when not in use. Do not store near heat, sparks, flame or strong oxidants. Adequate ventilation required sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. Tanks that have been in leaded gasoline service may have lead-containing residue. Special precautions needed in cleaning. See American Petroleum Institute publications 2013, 2015 and 2015A. No smoking, flame or other

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ignition sources.

To minimize fire or explosion risk from static charge accumulation and discharge, effectively ground product transfer system in accordance with the National Fire Protection Association standard for petroleum products.

For use as a motor fuel only. Do not use as a cleaning solvent, or thinner, or for other non-motor fuel uses. Do not siphon by mouth. Minute amounts of liquid gasoline aspirated into the lungs may cause potentially fatal chemical pneumonitis.

In order to prevent fire or explosion hazards, use appropriate equipment.

Information on electrical equipment appropriate for use with this product may be found in the latest edition of the National Electrical Code (NFPA-70). This document is available from the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

PERSONAL HYGIENE

Minimize breathing vapor or mist. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before re-use. Remove contaminated shoes and thoroughly clean and dry before re-use. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

J. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION

TRANSPORTATION INCIDENT INFORMATION

For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents, DOT P 5800.3.

DOT IDENTIFICATION NUMBER

Gasoline / Flammable Liquid / UN 1203

OSHA REQUIRED LABEL INFORMATION

In compliance with hazard and right-to-know requirements, the following OSHA Hazard Warnings should be found on a label, bill of lading or invoice accompanying this shipment.

DANGER!

EXTREMELY FLAMMABLE

**LONG-TERM, REPEATED EXPOSURE MAY CAUSE
CANCER, BLOOD AND NERVOUS SYSTEM DAMAGE**

CONTAINS: BENZENE

Note: Product label will contain additional non-OSHA related information.

The information and recommendations contained herein are, to the best of Exxon's knowledge and belief, accurate and reliable as of the date issued. Exxon does not warrant or guarantee their accuracy or reliability, and Exxon shall not be liable for any loss or damage arising out of the use thereof.

The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use. If buyer repackages this product, legal counsel should be consulted to insure proper health, safety and other necessary information is included on the container.

The Environmental Information included under Section H hereof as well as the Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by Exxon Company, U.S.A. in order to provide additional health and hazard classification information. The ratings recommended are based upon the criteria supplied by the developers of these rating systems, together with Exxon's interpretation of the available data.

APPENDIX C: NCDOT MSDS Fax Request Form

FOR MEDICAL EMERGENCIES CALL 1-(800) 451-8346

FOR ROUTINE MSDS FAX REQUESTS COMPLETE THE FOLLOWING AND FAX TO (619)677-0270

Requestor Information

Date Requested: _____

Name of Person Requesting: _____

Street Address: _____

City: _____, NC Zip: _____

Telephone: (_____) _____ Fax: (_____) _____

Manufacturer and Product Information

(Provide as much information as possible.)

Complete Label Name on Product: _____

Manufacturer Product/ Item Number: _____

UPC: _____

Manufacturer's Name: _____

City: _____ State: _____

Manufacturer's Phone # (If available): (_____) _____

Medical Emergency Information

Medical Provider: _____

Medical Provider: Fax No: (_____) _____

Medical Provider Phone No: (_____) _____

Questions other than MSDS requests may be directed to 3E Company , 4920 Carroll Canyon Road, San Diego, CA 02121, by calling (619) 677-0150

Lead in Construction

SPP# 1926.62

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1.0 Purpose

The purpose of this safety policy and procedure is to establish a program to prevent absorption, inhalation, or ingestion of harmful quantities of lead by North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Lead exposure can occur in NCDOT job activities that involve the disturbance of lead or lead containing materials. Additionally, some construction related activities such as the transport, disposal, storage, or containment of lead or lead containing materials on construction sites can also contribute to lead exposure.

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Lead overexposure adversely affects numerous body systems and causes forms of health impairment and disease.

This safety policy and procedure provides guidelines to protect NCDOT employees from the immediate and long term effects of lead. It includes a discussion on training, exposure assessment, and methods of compliance. Requirements are presented for Personal Protective Equipment (PPE), housekeeping, and hygiene facilities. It also presents provisions for medical surveillance, medical protection, signs, recordkeeping and observation and monitoring.

This document also details the areas of responsibility for managers/unit heads, supervisors, competent persons, qualified persons, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure covers the following job activities within NCDOT:

- Abrasive blasting in full containment on highway bridges, water tanks, and petroleum tanks
- Spray painting with lead based paint on highway bridges, water tanks, and petroleum tanks
- Spray painting with non-lead based paint on highway bridges, water tanks, and petroleum tanks
- Welding, cutting, and burning on highway bridge rehabilitation projects
- Other associated activities with highway bridge repainting and rehabilitation projects, water tank repainting, and petroleum tank repainting
- The application and removal of lead-based pavement markings

Additionally, this safety policy and procedure affects any other employee who in the performance of duties is exposed to lead.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.62).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, employees will not perform any lead related job activity without the proper training and proper Personal Protective Equipment (PPE). Where lead hazards exist that cannot be eliminated, then additional engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Lead in Construction will be implemented.

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These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Lead in Construction. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions and identifies responsibilities required by NCDOT's safety policy and procedure on Lead in Construction.

6.1 Definitions

Action Level (AL)

Airborne concentration of lead at 30 micrograms per cubic meter of air (30 ug/m³) calculated as an 8-hour time weighted average.

Competent Person

Person who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and has the authority to take prompt corrective measures to eliminate them.

Lead

Metallic lead, all inorganic lead compounds, and organic lead soaps.

Qualified Person

Person who has training and experience in air monitoring, exposure assessment, and workplace evaluations.

Permissible Exposure Limit (PEL)

Airborne concentration of lead at 50 micrograms per cubic meter of air (50 ug/m³) calculated as an 8 hour time weighted average.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

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- Training
- Initial Exposure Assessment
- Monitoring Requirements Due to the Initial Exposure Assessment
- Employee Exposures Above the PEL
- Compliance
- Respiratory Protection
- Personal Protective Clothing
- Housekeeping
- Hygiene Facilities
- Medical Surveillance Program
- Medical Removal Protection
- Signs
- Recordkeeping
- Observation and Monitoring

6.2.1 Training

Employees with potential job-related lead exposure and competent persons must be trained in:

- Specific hazards associated with their work environment
- Protective measures which can be taken against these hazards
- The danger of lead to their bodies and their families
- Employee rights under this safety policy and procedure and the OSHA Standard on Lead in Construction

Employees and competent persons will be trained prior to their initial job or reassignment. Additionally, refresher training shall be provided annually.

Qualified persons shall receive training to conduct exposure assessments. This training shall include as a minimum:

- Air sampler flow calibration
- Sample train set-ups
- Analytical procedures
- Air monitoring protocols
- OSHA Reference Methods
- Exposure calculations
- Exposure data statistical analyses

Qualified persons shall receive training upon initial assignment. Subsequent training shall be at the discretion of Safety and Loss Control.

6.2.2 Initial Exposure Assessment

If lead may be present in any operation, then an initial exposure assessment must be made to determine whether an employee's exposure exceeds the action level (30 ug/m³ averaged over an 8-hour day).

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Reasons for believing that lead is present include:

- Any information, observations or calculation which would indicate employee exposure to lead
- Any previous measurements of airborne lead
- Any employee complaints or symptoms which may be attributable to lead exposure

This initial assessment will document the exposure an employee would have without the use of a respirator.

This initial exposure assessment is not required if:

- Objective data is available which can conclusively demonstrate that no employee will be exposed in excess of the action level
- An exposure assessment has been conducted within the last 12 months for a project with very similar aspects as the project in question

This initial exposure assessment may be limited to a representative number of employees who are reasonably expected to have the highest exposure levels. Appendix A presents typical lead exposure levels for various lead-related work activities.

6.2.3 Monitoring Requirements Due to the Initial Exposure Assessment

The initial assessment of employee exposure may indicate the level to be:

- Less than the action level
- At or above the action level but less than the PEL
- Above the PEL

Employee exposures below the action level require no further monitoring.

Employee exposures at or above the action level but at or below the PEL require monitoring every 6 months. This monitoring must be continued at the required frequency until at least 2 consecutive measurements, taken at least 7 days apart, are below the action level, at which time monitoring may be discontinued for that employee.

Employee exposures above the PEL require quarterly monitoring. This monitoring must continue at this frequency until at least 2 consecutive measurements taken at least 7 days apart are at or below the PEL.

Within 5 working days after completion of the exposure assessment, the employee must be notified in writing of the exposure results. If the results indicate that the representative employee exposure without regard to respirators is at or above the PEL, the notice should so state and include a description of the corrective action to be taken to reduce exposure below that level.

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6.2.4 Employee Exposures Above the PEL

Based on available exposure data and OSHA recommendations, there are 3 groups of lead-related tasks/operations that presume employee lead exposure above the PEL. The levels are:

- Employee exposure between the PEL and 500 ug/m³ with a respirator protection factor of 10
- Employee exposure above 500 ug/m³ and less than 2500 ug/m³ with a respirator protection factor between 10 and 50
- Employee exposure greater than 2500 ug/m³ with a respirator protection factor greater than 50

Employee exposure between the PEL and 500 ug/m³ include the following lead-related tasks/operations:

- Manual demolition of structures
- Manual scraping, manual sanding, heat gun applications, power tool cleaning with dust collection systems
- Spray painting with lead based paint

Employee exposure above 500 ug/m³ and less than 2500 ug/m³ may include the following lead-related tasks/operations:

- Using lead containing mortar
- Lead burning
- Rivet busting
- Power tool cleaning with dust collection systems
- Clean up activities where dry expendable abrasives are used
- Abrasive blasting enclosure movement and removal

Employee exposure greater than 2500 ug/m³ may include the following lead related tasks/operations:

- Abrasive blasting and welding, cutting and torch burning on steel structures where lead containing coatings or paint are present

For those lead-related tasks/operations which presume lead exposures above the PEL, interim protection must be provided to employees until an employee assessment is completed. Interim protection measures include:

- Appropriate respiratory protection
- Appropriate Personal Protective Equipment and clothing
- Change areas
- Hand washing facilities
- Biological monitoring
- Training

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6.2.5 Compliance

To ensure that no employees are exposed to lead in excess of the 8-hour PEL, engineering, administrative, and work practice controls must be implemented. When these controls are not adequate to reduce exposures below the PEL, appropriate respiratory protection must be used. Appendix B presents a summary of control practices that must be used at exposure levels below the action level, between the action level and PEL and at or above the PEL.

Prior to beginning any job where employee exposures may reach or exceed the PEL without respiratory protection, a written compliance plan must be developed and implemented. Appendix C presents the NCDOT model lead compliance plan that can be used for multiple lead-related tasks/operations. Appendix D presents a simpler lead compliance plan for one lead-related task/operation.

6.2.6 Respiratory Protection

Respirators must be used when the concentration of lead is at or above the PEL after engineering and work practice controls have not been sufficient to reduce exposures. Additionally, if an employee requests a respirator, a powered air purifying respirator must be provided.

Refer to [SPP# 1910.134, Respiratory Protection](#), and NCDOT's Respiratory Protection program for additional details on the basic requirement for selection, use, cleaning, and maintenance of respirators. Appendix E presents an analysis of engineering controls and respirators needed to achieve compliance with 50 ug/m³ for NCDOT lead-related tasks/operations.

6.2.7 Protective Clothing

Appropriate protective clothing and equipment must be provided to employees who are exposed to lead above the PEL without regard to the use of a respirator. Protective clothing and equipment is necessary to protect employees from transporting lead from work to home. Appropriate protective clothing and equipment can include:

- Coveralls or similar full body work clothing
- Gloves
- Hats or hoods (e.g. tyvek hoods)
- Shoes or disposable shoe coverlets
- Face shields or vented goggles

Clean work clothing must be provided weekly to employees whose exposure levels are above the PEL and daily to those employees whose exposure level is above 200 ug/m³. Protective clothing is required to be removed in a change area.

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The contaminated protective clothing that is to be cleaned, laundered, or disposed of is to be placed in a closed labeled container in the change area. Anyone who cleans or launders protective clothing or equipment must be informed of the potentially harmful effects of lead.

6.2.8 Housekeeping

All surfaces should be maintained as free as practical of lead dust accumulation. Vacuuming these surfaces with high-efficiency particulate air (HEPA) filters is the preferred method of housekeeping. The HEPA filters must be emptied in a manner which minimizes lead dust reentry into the workplace. Dry or wet sweeping, shoveling or brushing may be used only if vacuuming or equally effective methods have been tried and do not work.

6.2.9 Hygiene Facilities

Hygiene facilities must be provided to ensure employee compliance with basic hygiene practices. For employees who have exposure greater than the PEL, the following are required:

- Shower facilities, if feasible
- Clean areas for changing clothes
- Eating areas (apart from contaminated areas)

Additionally, for all employees who perform lead-related tasks/operations (regardless of lead level), hand washing facilities must be provided.

Employees are prohibited from smoking, eating, and applying cosmetics in areas where the PEL is exceeded. Additionally no tobacco products, food items, or cosmetics are to be kept in work areas where employees are exposed to lead above the PEL.

6.2.10 Medical Surveillance Program

The purpose of medical surveillance is to prevent lead-related disease. Although controls may be in place to prevent overexposure to lead, control systems may fail and/or hygiene and respirator programs may be inadequate. Therefore, a medical program with periodic surveillance will help detect those failures.

Medical surveillance provisions include two phases:

- Initial
- Full program

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Initial medical surveillance is to be provided to employees prior to assignment who are being assigned to an area where the airborne concentration of lead exceeds the action level at any time. This initial medical surveillance will consist of an initial medical examination and biological monitoring.

The initial medical examination will provide information to establish a baseline to which subsequent data can be compared. Biological monitoring consists of blood lead level (BLL) and zinc protoporphyrin (ZPP) level tests. Biological monitoring results determine whether an employee will or will not require full medical surveillance.

A full medical surveillance program is to be provided to employees whose blood lead level is at or above 40 micrograms per deciliter (40 ug/dl) and who are exposed to lead in excess of the action level for more than 30 days a year. This program consists of:

- Periodic biological monitoring
- Medical examinations

Biological monitoring must be performed every 2 months for the first 6 months and every 6 months thereafter until the blood level is below 40 ug/dl. If an employee's BLL exceeds 40ug/dl, then the employee must be notified in writing within 5 working days of the receipt of the test results.

Medical examinations includes several requirements and conditions that must be followed. These include:

- Initial medical examinations (as discussed in the initial medical surveillance section)
- Annual medical examinations
- Medical examinations on request
- Followup medical examinations
- Multiple physician review
- Information provided to a physician performing a medical examination
- Physician's report

Appendix F further details the requirements and conditions associated with medical examinations.

6.2.11 Medical Removal Protection

Medical Removal Protection (MRP) is a means of protecting employees when engineering controls, work practices, and respirators have failed to provide the required protection to employees. MRP involves the temporary removal of an employee from the regular job to a place of significantly lower exposure without any loss of earnings, seniority, or other rights and benefits.

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Temporary medical removal can occur:

- When an employee's blood lead level exceeds 50 ug/dl
- Upon the recommendation of the examining physician

Employees who are removed due to an elevated BLL (BLL exceeded 50 ug/dl at time of removal) must receive a monthly BLL test. If medical opinion caused employee removal, the employee must be provided medical tests or examinations that the physician believes to be appropriate.

Employees with elevated blood levels can be removed for up to 18 months providing the job continues. Employees may return to their former job when 2 consecutive blood lead level tests are at 40 ug/dl or below. Employees removed by medical opinion may return only when the physician indicates that it is safe to do so.

6.2.12 Signs

Warning signs must be posted in work areas where the exposure of lead exceeds the PEL. These signs must contain of the following words or phrases:

**WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING**

6.2.13 Recordkeeping

Three sets of records may be required based upon the severity of the exposure. These include:

- Exposure monitoring records
- Biological monitoring and medical examination records
- Medical removal protection records

All exposure monitoring records for airborne lead must be retained. These records must include:

- Name and job classification of the employees
- Details of the sampling and analytical techniques
- Results of the sampling
- Type of respiratory protection worn by the person sampled

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These exposure monitoring records are to be retained for 30 years.

All biological monitoring and results of medical examinations must also be retained. These records must include:

- Names of the employees
- Physician's written opinion
- Copy of the results of the examination

These biological monitoring and medical examination records must be retained for the duration of employment plus 30 years. If employee's employment is less than 1 year, these records need not to be retained if they are provided to the employee at termination.

Medical removal protection records must also be retained as applicable. These records must include:

- Name of employee
- Employee's social security number
- Date of employee removal
- Date of employee return
- How the removal was accomplished
- Whether or not the removal was for an elevated blood lead level

These medical removal protection records are to be retained for the duration of an employee's employment.

6.2.14 Observation of Monitoring

Employees or their designated representatives may observe lead air monitoring at their worksite. Employees who observe the lead air monitoring are entitled to an explanation of the measurement procedure and to record the results that are obtained. Employees must be provided with appropriate personal protective equipment during the lead air monitoring.

SAFETY POLICY & PROCEDURE

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for equipment and supplies to protect employees from lead overexposure.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. They will also designate competent persons for those work activities affected by this safety policy and procedure. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that no lead-related task/operation is performed without the appropriate controls being in place as prescribed in this safety policy and procedure. They will also assist competent and qualified persons as requested in the performance of their duties.

6.3.3 Competent Persons

Competent persons will be responsible for identifying existing and predictable lead hazards in lead-related task/operations. They will be also responsible for taking prompt corrective measures to eliminate lead hazards.

6.3.4 Qualified Persons

Qualified persons shall be responsible for conducting lead exposure assessments in accordance with this safety policy and procedure and established exposure assessment protocols.

6.3.5 Employees

Employees shall comply with the the provisions outlined in this safety and procedure. They are also responsible for immediately reporting any task/operation to their supervisor where there is suspicion of lead exposure.

6.3.6 Safety and Loss Control and Bridge Maintenance Safety Officer

Safety and Loss Control and the Bridge Maintenance Safety Officer will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control and the Bridge Maintenance Safety Officer will assist in developing or securing the required training.

SAFETY POLICY & PROCEDURE

Safety and Loss Control and the Bridge Maintenance Safety Officer will be responsible for providing training, expertise, and guidance to qualified persons to perform lead exposure assessments. Also, Safety and Loss Control and the Bridge Maintenance Safety Officer may appoint and designate certain individuals to be qualified persons.

Additionally, the Safety Engineers, the Industrial Hygienist and the Bridge Maintenance Safety Officer will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

SAFETY POLICY & PROCEDURE

APPENDIX A: Representative TWA(8) Exposure Levels in ug/m³ with No Engineering Controls and Respiratory Protection

Construction Activity	Exposure Level Used To Specify Controls
Open abrasive blasting	23,680
Open abrasive blasting in full containment	37,300
Vacuum blasting	558
Welding, cutting and burning on bridges	1,564
Other welding, cutting, and burning	973
Lead burning	663
Spray painting lead-based paint	101
Hand scraping	96
Removal and replacement of building components	9
Manual demolition of building components	77
Heat gun use	32
Chemical stripping	15
Encapsulation	4
Power tool use (housing abatement projects)	296
Power tool use (other paint removal projects)	1,314
Use of lead mortar	8
Soldering and brazing	9
Use of lead mortar	663
Stained glass removal	79
Handling lead shot, brick, or sheet	16
Industrial vacuuming	994
Cutting lead foil panels	1
Reinsulation over existing mineral wood	90
Miscellaneous enclosure movement	1,156
Miscellaneous abrasive blasting/repainting	1,904
Miscellaneous remodeling related	76
Miscellaneous lead abatement	8
Miscellaneous steel structure rehabilitation	262
Spray painting non-lead-based paint	26
Brush painting non-lead-based paint	3

SAFETY POLICY & PROCEDURE

APPENDIX B: Summary of Control Practices

Control Practice	Exposure Below 30 ug/m ³ (AL)	Exposure Between Al and PEL	Exposure Above 50 ug/m ³ (PEL)
Determination of the Presence of Lead	X	X	X
Competent Person			X
Exposure Monitoring and Associated Recordkeeping	X	X	X
Mechanical Ventilation		X*	X
Local Exhaust Ventilation		X*	X
Enclosures/Containment Systems			X
HEPA Vacuums	X	X	X
Wetting Agents	X	X	X
Written Compliance Program			X
Warning Signs			X
Worker Training		X	X
Notification of Other Employees	X	X	X
Respiratory Protection			X
Protective Clothing/Gloves/Shoe Cover			X
Handwashing Facilities Only	X	X	X
Change Areas with Storage Facilities			X
Decontamination Facilities Including Showers			X
Eating Areas and Facilities			X
Biological Monitoring and Associated Recordkeeping		X	X
Medical Examinations and Associated Recordkeeping		X	X
Medical Removal Protection	X	X	X

X Indicates that the corresponding control practice is required at that exposure level.

* Could eliminate blood test

APPENDIX C: NCDOT Model Lead Compliance Plan

**Lead Compliance Plan
for _____**

(Work Group Name)

This plan should be updated every six months

Compliance Plan Date: _____

Location: _____

Division/Unit: _____

Plan Submitted by: _____

(Name)

(Title)

This Lead Compliance Plan contains the following components:

- Lead-Emitting activities covered by this plan
- Equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures, maintenance practices, means used to achieve compliance, plans and studies used to determine compliance and technology considered to meet the PEL for each of the activities covered by this plan
- Air monitoring data
- Compliance plan implementation schedule
- Work practice requirements
- Hygiene facilities and practices
- Administrative controls
- Contractor arrangements

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 2

Lead-Emitting Activities Covered by this Plan

(Check the appropriate box(es) for the Lead-emitting activities covered by this plan.)

Activity #

- | | | |
|----|--------------------------|--|
| 1 | <input type="checkbox"/> | Open abrasive blasting |
| 2 | <input type="checkbox"/> | Open abrasive blasting in full containment |
| 3 | <input type="checkbox"/> | Vacuum blasting |
| 4 | <input type="checkbox"/> | Welding, cutting, and burning on bridges |
| 5 | <input type="checkbox"/> | Other welding, cutting, and burning |
| 6 | <input type="checkbox"/> | Lead burning |
| 7 | <input type="checkbox"/> | Spray painting lead-based paint |
| 8 | <input type="checkbox"/> | Hand scraping |
| 9 | <input type="checkbox"/> | Removal and replacement of building components |
| 10 | <input type="checkbox"/> | Manual demolition of building components |
| 11 | <input type="checkbox"/> | Heat gun use |
| 12 | <input type="checkbox"/> | Chemical stripping |
| 13 | <input type="checkbox"/> | Encapsulation |
| 14 | <input type="checkbox"/> | Power tool use, non-vacuum shrouded |
| 15 | <input type="checkbox"/> | Power tool use, vacuum shrouded |
| 16 | <input type="checkbox"/> | Soldering and brazing |
| 17 | <input type="checkbox"/> | Use of lead mortar |
| 18 | <input type="checkbox"/> | Handling lead shot, brick, or sheet |
| 19 | <input type="checkbox"/> | Cutting lead foil panels |
| 20 | <input type="checkbox"/> | Reinsulation over existing mineral wood |
| 21 | <input type="checkbox"/> | Miscellaneous enclosure movement |
| 22 | <input type="checkbox"/> | Miscellaneous abrasive blasting/repainting |
| 23 | <input type="checkbox"/> | Miscellaneous lead abatement |
| 24 | <input type="checkbox"/> | Miscellaneous steel structure rehabilitation |
| 25 | <input type="checkbox"/> | Spray painting non-lead-based paint |
| 26 | <input type="checkbox"/> | Brush painting non-lead-based paint |

SAFETY POLICY & PROCEDURE

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 3

For each of the previously checked activities, list the required information:

<u>Activity #</u>	<u>Equipment Used</u>	<u>Material Involved</u>	<u>Controls in Place</u>	<u>Crew Size</u>

SAFETY POLICY & PROCEDURE

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 4

For each of the previously checked activities, list the required information:

<u>Activity #</u>	<u>Employee Job Responsibilities</u>

SAFETY POLICY & PROCEDURE

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 5

For each of the previously checked activities, list the required information:

<u>Activity #</u>	<u>Operating Procedures</u>

SAFETY POLICY & PROCEDURE

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 6

For each of the previously checked activities, list the required information:

<u>Activity #</u>	<u>Maintenance Practices</u>

SAFETY POLICY & PROCEDURE

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 7

For each of the previously checked activities, list the required information :

<u>Activity #</u>	<u>Specific Means That Will Be Used To Achieve Compliance</u>

SAFETY POLICY & PROCEDURE

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 8

If engineering controls are required, list the engineering plans and studies used to determine the lead control methods for each lead-emitting activity.

<u>Activity #</u>	<u>Document/Author or Contributors</u>

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 9

Air Monitoring Data

For the lead-emitting activities covered by this compliance plan, list results of air monitoring data that documents the source of lead emissions.

<u>Activity #</u>	<u>Air Monitoring Data Lead Emissions Results (ug/m³)</u>	<u>Date of Collection</u>

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 10

Compliance Plan Implementation Schedule

List the milestone activities (e.g., write compliance plan, submit purchase orders for the required control equipment, receive control equipment, secure construction contracts, construction activities start dates, construction activities end date, etc.) for implementing this compliance plan.

<u>Milestone Activity</u>	<u>Completion Date</u>

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 11

Work Practice Requirements

Protective Work Clothing and Equipment

If employees are exposed to:

- Lead above the PEL without regard to the use of a respirator
- Lead compounds such as lead arsenate or lead azide;

then protective work clothing and equipment appropriate to the hazard must be provided and worn.

Appropriate work clothing can include:

- Coveralls or similar full-body clothing
- Gloves
- Hats
- Shoes or disposable shoe coverlets
- Face shields or vented goggles

If employees' exposure to airborne lead is greater than 200 ug/m³, clean and dry clothing must be provided daily.

If employees' exposure to airborne lead is less than 200 ug/m³, clean and dry clothing must be provided weekly.

Work Procedures

The following procedures should be observed prior to beginning work:

- Change into work clothing and shoe covers in the clean section of the designated changing areas
- Use work garments and appropriate protective gear, including respirators, before entering the work area
- Store any clothing not worn under protective clothing in the designated changing area

Employees should follow these procedures upon leaving the work area:

- HEPA vacuum heavily contaminated protective work clothing while it is still being worn. At no time may lead be removed from protective clothing by any means which result in uncontrolled dispersal of lead into the air
- Remove disposable shoe covers and dispose
- Remove the protective clothing and gear in the dirty area of the designated changing area
- Remove protective coveralls by carefully rolling down the garment to reduce exposure to dust
- Remove respirators last

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 12

Work Procedures (Continued)

- Wash hands and face

Employees should follow these procedures upon finishing work for the day (in addition to procedures described above):

- Where applicable, place disposal coveralls and shoe covers with the abatement waste.
- Contaminated clothing which is to be cleaned, laundered or disposed of must be placed in closed containers in the change room
- Clean protective gear, including respirators, according to standard procedures
- Wash hands and face again. If showers are available, take a shower and wash hair. If shower facilities are not available at the work site, shower immediately at home and wash hair

Housekeeping

All surfaces shall be maintained as free as practicable of accumulations of lead dust. Vacuuming is the preferred method of meeting this requirement.

Dry or wet sweeping, shoveling, or brushing may not be used except where vacuuming or other equally effective methods have been tried and do not work. Vacuums must be equipped with a high-efficiency particulate air (HEPA) filter and emptied in a manner which minimizes the reentry of lead into the workplace.

Hygiene Facilities and Practices

Change Areas

Clean change areas shall be provided for employees whose exposure to airborne lead is above the PEL.

These areas shall be equipped with separate storage facilities for (1) protective work clothing and equipment and for (2) street clothes.

Employees will not leave the workplace wearing any protective clothing or equipment that is required to be worn during the work shift.

Showers

Shower facilities shall be provided, where feasible, for use by employees whose exposure to airborne lead is above the PEL.

Where shower facilities are available, employees must shower at the end of the work shift. Showers will have an adequate supply of cleaning agents and towels for use by affected employees.

SAFETY POLICY & PROCEDURE

APPENDIX C: NCDOT Model Lead Compliance Plan (Continued) 13

Eating Areas

Lunchroom facilities or eating areas shall be provided for employees whose exposure to airborne lead is above the PEL, without regard to the use of respirators. These facilities or eating areas must be as free as practicable from lead contamination and be readily accessible to employees.

Employees exposed above the PEL, without regard to the use of a respirator, must wash their hands and face prior to eating, drinking, smoking, or applying cosmetics.

Employees must not enter lunchroom facilities or eating areas with protective work clothing or equipment unless surface lead dust has been removed by vacuuming in a downdraft booth, or other cleaning method that limits dispersion of lead dust.

Hand Washing Facilities

Adequate hand washing facilities, including soap and towels, will be provided for use by employees exposed to any level of lead. Where showers are not provided, the employees must wash their hands and face at the end of the workshift.

Mechanical Ventilation

The mechanical performance of the ventilation system used to control lead exposure will be evaluated as necessary to maintain its effectiveness.

Administrative Controls

Yes No

☐☐

Are employees rotated among jobs as a means of reducing their TWA lead exposure? If yes, then the following is required:

- Name and social security number of affected employees
- Duration and exposure levels at each job station where each affected employee is located

Contractor Arrangements

Describe the arrangements that have been made with contractors on this job site to ensure that all employees are informed about the potential exposure to lead. _____

APPENDIX D: Sample Lead Compliance Plan

A PROCEDURE FOR REMOVAL OF LEAD-CONTAINING PAINT

Lead containing paint will be removed from the walls and ceiling of the hallway of Building A of the XYZ state facility. The total area of paint to be removed is _____ square feet.

Two employees of the Maintenance Department will trowel paste onto the painted surfaces and cover the paste with a fibrous laminated cloth. Twenty-four hours after applying the paste, they will use a taping knife to pry up the edges of the cloth and remove the cloth, paste and paint away in one piece. They will remove as much of the residue as possible with the knife or other tool. They will place the cloth, paste, and paint in plastic bags and dispose of them in compliance with local regulations.

After removal of the cloth, paste, and paint, they will sponge the surface with water. After 24 hours, they will clean the surface with an alkaline solution.

B PROTECTIVE MEASURES

Maintenance employees will wear Tyvek suits with hoods, Tyvek booties, face shields, and rubber gloves taped to the sleeves of the Tyvek suits during the removal operation.

C TECHNOLOGY CONSIDERED

These three technologies were considered: (1) Removal using a hand-held power sander, (2) Use of a contained blast system, and (3) Chemical removal using a paste.

D AIR MONITORING DATA

Since no **lead** is emitted into the air when paint is removed chemically using a paste, there will be no **need** to monitor exposures.

E SCHEDULE

The paste will be applied to the painted surfaces and covered with a cloth on (Date). The paste, paint, and cloth will be removed and disposed of and the walls will be rinsed off on (Date). The walls will be cleaned with an alkaline solution on (Date).

APPENDIX D: Sample Lead Compliance Plan (Continued) 2

F WORK PRACTICE PROGRAM

The maintenance workers will take the protective measures described in Section B of this plan. They will perform the same tasks for the same time period; there will be no task rotation.

G ADMINISTRATIVE CONTROL SCHEDULE

Since there will be no rotation of tasks, an administrative control schedule is not applicable to this project.

H ARRANGEMENTS WITH CONTRACTORS

No part of this project has been contracted out.

SAFETY POLICY & PROCEDURE

APPENDIX E: Analysis of Engineering Controls and Respirators Needed to Achieve Compliance with the 50 ug/m³ (PEL)

Project Type Activity	Exposure Level Used to Specify Controls (ug/m ³)	Type of Ventilation Controls Specified (by activity)	Other Types of Controls Specified (by project)	Exposure Level After Control Application (ug/m ³)	Respirator Type Specified
Highway and Railroad Bridge Repairing			MV,WA		
Abrasive blasting in full containment	37,300	MV		18,650	10
Spray painting with LBP	101	MV		51	5
Spray painting with non-LBP	26	MV		13	
Enclosure movement	1,156			1,156	4
Associated miscellaneous activities	1,904			1,904	4
Highway and Railroad Bridge Rehabilitation			HV,WA		
Welding, cutting, burning on bridges	1,564	MV		782	4
Associated miscellaneous activities	282		HV	<50	1
Water Tank Repainting			HV,WA		
Abrasive blasting in full containment	37,300	MV		18,650	10
Spray painting with LBP	101	MV		51	5
Spray painting with non-LBP	26	MV		13	
Enclosure movement	1,156			1,156	4
Associated miscellaneous activities	1,904			1,904	4
Petroleum Tank Repainting			HV,WA		
Abrasive blasting in full containment	37,300	MV		18,650	10
Spray painting with LBP	101	MV		51	5
Spray painting with non-LBP	26	MV		13	
Enclosure movement	1,156			1,156	4
Associated miscellaneous activities	1,904			1,904	4

Control Abbreviations

MV = Mechanical Ventilation
 HV = HEPA Vacuuming
 WA = Wetting Agents

Respirator Types Codes

- 1 = Half mask cartridge
- 2 = Full face cartridge
- 3 = Pressure air respirator, Loose fitting
- 4 = Pressure air respirator, tight fitting
- 5 = Half mask supplied air
- 6 = Full face supplied air
- 7 = Loose fitting supplied air helmet
- 8 = Full face SCBA
- 9 = Air supplied welding helmet
- 10 = Abrasive blasting helmet with face piece

APPENDIX F: Medical Examination Requirements and Conditions

Initial Medical Examinations

The initial medical examination provides information from which baseline data can be established for the employee. Contents are detailed in this Appendix.

Annual Medical Examinations

Annual medical examinations must be made available to employees whose BLL exceeds 40 ug/dl at any time during the preceding year and who are exposed to airborne lead concentration that exceeds the action level (30 ug/m³) for more than 30 days.

Medical Examinations Upon Request

If an employee experiences signs or symptoms associated with lead poisoning or has difficulty breathing while wearing a respirator, a medical examination or consultation must be provided as soon as possible. Additionally, employees may request medical advice concerning the effects of current or past exposure to lead on their reproductive abilities.

Followup Medical Examinations

Appropriate followup medical examinations or consultation must be provided to employees who have been temporarily removed from exposure under the medical removal protection provisions of this safety policy and procedure and the OSHA standard.

Initial and Annual Medical Examinations Content

The content of the initial and annual medical examinations must include:

- A detailed work and medical history
- A thorough physical examination including an evaluation of the employee's pulmonary status if they will be required to wear a respirator
- Vital signs
- A series of laboratory tests to check the employee's blood chemistry and kidney function
- Upon request of the employee, a laboratory evaluation of male fertility or a pregnancy test

The content of the other types of medical examinations and consultations covered by this safety policy and procedure is at the discretion of the examining physician.

Multiple Physician Review

If an employee is dissatisfied with an examination by the physician selected by NCDOT, a second physician can be selected to conduct an independent analysis. The two physicians would attempt to resolve any differences of opinion, and select a third physician to resolve any unresolved dispute.

APPENDIX F: Medical Examination Requirements and Conditions (Continued) 2

Information That is to be Provided to a Physician

Physicians must be provided the following information from NCDOT on employees that are to be medically examined:

- This safety policy and procedure and the related OSHA standard with its appendices
- A description of the employee's duties as they relate to occupational lead exposure
- The employee's exposure level or anticipated exposure level
- A description of the personal protective equipment the employee wears
- Prior blood lead level results
- Prior written medical opinions

Physician's Report

After an examination or consultation, the physician must prepare a written report that contains:

- Physician's opinion as to whether or not the employee has any medical condition which places the employee at increased risk of health impairment from exposure to lead
- Special protective measures that are to be provided to the employee
- Blood lead level determinations
- Limitations on the use of respirators. (This determination must also include whether the employee can wear a powered air purifying respirator if unable to wear a negative pressure respirator.)

Ladders**SPP# 1910.25****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the safe use of ladders throughout North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Ladders are used when employees need to move up or down between two different levels. Slips, trips, and falls are significant contributors to NCDOT's accidents. Slips, trips, and falls can occur when wrong ladder selection is made and when improper climbing techniques and/or defective ladders are used.

This safety policy and procedure provides guidelines for the safe use of ladders. It presents discussion on the types of ladders, the use of ladders, and inspection and maintenance requirements.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure applies to all NCDOT employees who use ladders.

SAFETY POLICY & PROCEDURE

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.25-27) and Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.1053).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore in NCDOT, the appropriate ladder will be used for the corresponding job and defective ladders will not be used. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding ladders will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Ladders. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's safety policy and procedure on Ladders.

6.1 Definitions

Cage

A guard that may be referred to as a cage or basket guard which is an enclosure that is fastened to the side rails of the fixed ladder or to the structure to encircle the climbing space of the ladder for the safety of the person who must climb the ladder.

Extension Ladder

Non-self-supporting portable ladder adjustable in length. It consists of two or more sections traveling in guides or brackets so arranged as to permit length adjustment. Its size is designated by the sum of the lengths of the sections measured along the side rails.

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Fixed Ladder

Ladder permanently attached to a structure, building, or equipment.

Individual-Rung Ladder

Fixed ladder each rung of which is individually attached to a structure, building, or equipment.

Ladder

An appliance usually consisting of two side rails joined at regular intervals by cross-pieces called steps, rungs, or cleats, on which a person may step in ascending or descending.

Ladder Safety Device

Device, other than a cage or well, designed to eliminate or reduce the possibility of accidental falls and which may incorporate such features as life belts, friction brakes, and sliding attachments.

Pitch

The included angle between the horizontal and the ladder, measured on the opposite side of the ladder from the climbing side.

Platform Ladder

A self-supporting ladder of fixed size with a platform provided at the working level. The size is determined by the distance along the front rail from the platform to the base of the ladder.

Rail Ladder

Fixed ladder consisting of side rails joined at regular intervals by rungs or cleats and fastened in full length or in sections to a building, structure, or equipment.

Railings

A railing is any one or a combination of those railings constructed in accordance with 1910.23. A standard railing is a vertical barrier erected along exposed edges of floor openings, wall openings, ramps, platforms, and runways to prevent falls of persons.

Rungs

Ladder cross-pieces of circular or oval cross-section on which a person may step in ascending or descending.

Section Ladder

Non-self-supporting portable ladder, nonadjustable in length, consisting of two or more sections of ladder so constructed that the sections may be combined to function as a single ladder. Its size is designated by the overall length of the assembled sections.

Side-Step Ladder

A ladder in which an individual getting off at the top must step sideways in order to reach the landing.

Single Ladder

Non-self-supporting portable ladder, nonadjustable in length, consisting of but one section. Its size is designated by the overall length of the side rail.

Special-Purpose Ladder

Portable ladder which represents either a modification or a combination of design or construction features in one of the general-purpose types of ladders previously defined, in order to adapt the ladder to special or specific uses.

Stepladder

Self-supporting portable ladder, nonadjustable in length, having flat steps and a hinged back. Its size is designated by the overall length of the ladder measured along the front edge of the side rails.

Steps

Flat cross-pieces of a ladder on which a person may step in ascending or descending.

Through Ladder

A ladder in which an individual getting off at the top must step through in order to reach the landing.

Well

A permanent complete enclosure around a fixed ladder, which is attached to the walls of the well. Proper clearances for a well will give the person who must climb the ladder the same protection as a cage.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Ladder Types
- Ladder Hazards
- Ladder Use
- Ladder Safety Devices
- Inspection
- Maintenance

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6.2.1 Training

Employees using the ladders shall be trained in:

- The proper use of the ladders
- What kind of ladder to use
- How to set up ladders
- Ladder inspection
- Proper maintenance

This training shall be done upon initial employment and/or job assignment. Refresher training shall be provided to employees at the discretion of their supervisor.

6.2.2 Ladder Types

There are many types of ladders used in NCDOT. They are classified by material of construction (wood, metal), load capacity, function, and design.

Ladder designs can include portable or fixed in-place ladders. Common types of portable ladders are step, platform, straight, and extension ladders. Figure 1 illustrates examples of common portable step ladders.

Fixed ladders are permanently attached to a structure or building and can also be constructed of different materials. Appendix A presents design requirements for fixed ladders.



Figure 1

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6.2.3 Ladder Hazards

There are inherent hazards associated with ladder use. Typical ladder hazards include:

- Insufficient surface resistance on ladder rungs and steps
- Ladder structural failure
- Ladders tipping sideways, backwards, or slipping out at the bottom
- Ladder spreaders not fully opened and locked, causing the ladder to “walk”, twist or close up when a load is applied to the ladder
- Using metal ladders around electricity
- Using deteriorated ladders
- Using fixed ladders without cages or fall protection

6.2.4 Ladder Use

Employees should follow certain rules when placing, ascending, and descending ladders which include:

- Hold on with both hands when going up or down. If material must be handled, raise or lower it with a rope either before going down or after climbing to the desired level.
- Always face the ladder when ascending or descending.
- Never slide down a ladder.
- Be sure shoes are not greasy, muddy, or slippery before climbing.
- Do not climb higher than the third rung from the top on straight or extension ladder, or the second tread from the top on stepladders.
- Carry tools on a tool belt not in the hand.
- Never lean too far to the sides. Keep your belt buckle within the side rails.

Other recommended general practices include:

- Use a 4 to 1 ratio when leaning a single or extension ladder. (e.g. place a 12 foot ladder so that the bottom is 3 feet away from the object the ladder is leaning against.)
- Inspect ladder for defects before using.
- Never use a defective ladder. Tag or mark it so that it will be repaired or destroyed.
- Never splice or lash a short ladder together.
- Never use makeshift ladders, such as cleats fastened across a single rail.
- Be sure that a stepladder is fully open and the metal spreader locked before starting to climb.
- Keep ladders clean and free from dirt and grease.

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- Never use ladders during a strong wind except in an emergency and then only when they are securely fastened.
- Never leave placed ladders unattended.
- Never use ladders as guys, braces, or skids, or for any other purpose other than their intended purposes.
- Never attempt to adjust a ladder while a user is standing on the ladder.
- Never jump from a ladder. Always dismount from the bottom rung.

6.2.5 Ladder Safety Devices

Safety devices are available for both portable and fixed ladders to prevent a climber from falling. Safety devices for portable ladders include slip-resistant bases, safety tops, and any other device to increase the ladder stability. A portable ladder positioned at a location where it may be tipped over by work activities shall be securely fastened at the bottom and top.

Safety devices for fixed ladders include cages (which enclose the stairwell) or a restraint belt attached to a sliding fixture anchored to the ladder. Figure 2 presents a typical restraint belt configuration for fixed ladders.

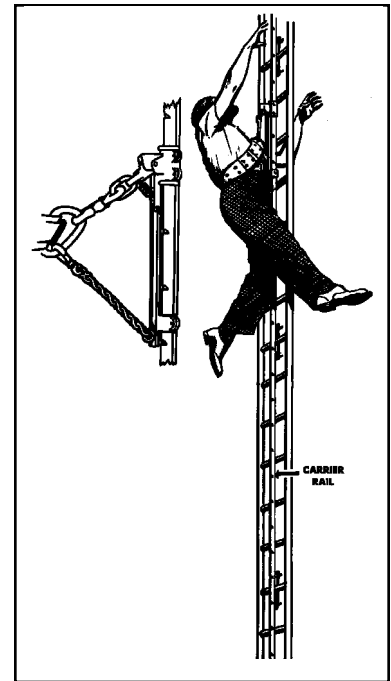


Figure 2

6.2.6 Inspection

An inspection program should be set up by which all ladders are inspected once every three months. Appendix B presents a general inspection form.

Ladders that are weak, improperly repaired, damaged, have missing rungs, or appear unsafe shall be removed from the job or site for repair or disposal. Before discarding a wood ladder, cut it up so no one can use it again.

Additionally, portable ladders must be maintained in good condition at all times and inspected frequently. Tag any ladders that have developed defects with DANGEROUS--DO NOT USE, and remove from service for repair or disposal.

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For portable wood ladders, all wood parts shall be free from sharp edges and splinters; sound and free from accepted visual inspection from shake, wane, compression failures, decay, or other irregularities.

For portable metal ladders, the design shall be without structural defects or accident hazards such as sharp edges, burrs, etc. The selected metal shall be of sufficient strength to meet the test requirements and shall be protected against corrosion.

For fixed ladders, all wood parts shall meet the criteria of wood ladders. All metal parts shall meet the criteria of metal ladders.

6.2.8 Maintenance

Portable wood ladders may be coated with a water-repellent preservative to provide a suitable protective material. Metal ladders and metal parts on wood ladders should be corrosion-resistant and kept free from nicks. If nicks occur, they should be promptly treated to prevent possible metal fatigue due to rust.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of ladders in their areas. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors are responsible for ensuring that all ladders (fixed and portable) are regularly inspected and properly maintained. They will also be responsible for tagging ladders in need of repair and removing defected ladders from service for repair or destruction.

Supervisors will audit for compliance with this safety policy and procedure during their facility and jobsite audits.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees are also responsible for reporting immediately suspected unsafe conditions or ladders to their supervisor. Employees are to inspect ladders before using and are to keep ladders clean and in good condition.

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6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors or others as applicable on any matter concerning this safety policy and procedure. Additionally, Safety and Loss Control will assist in developing or securing of required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased ladders comply with this safety policy and procedure and current safety regulations.

6.3.5 Central Equipment Unit

Central Equipment Unit will ensure that ladders are available through inventory and will maintain a supply of replacement parts for ladders that can be repaired.

APPENDIX A: Miscellaneous Requirements for Ladders

Load Requirements

- The minimum design live load shall be a single concentrated load of 200 pounds.
- The number and position of additional concentrated live-load units of 200 pounds each as determined from anticipated usage of the ladder shall be considered in the design.
- The live loads imposed by persons occupying the ladder shall be considered to be concentrated at such points as will cause the maximum stress in the structural member being considered.
- The weight of the ladder and attached appurtenances together with the live load shall be considered in the design of rails and fastenings.

Design Stresses

- Design stresses for wood components of portable wood ladders shall not exceed those specified in [SPP# 1910.25](#). All wood parts of fixed ladders shall meet the requirements of 1910.25(b).
- For fixed ladder consisting of wood side rails and wood rungs or cleats, used at a pitch in the range 75 degrees to 90 degrees, and intended for use by no more than one person per section, single ladders as described in 1910.25(c)(3) (ii) are acceptable.

General Use Requirements

- Portable stepladders longer than 20 feet shall not be used.
- Type I - Industrial ladders shall be the type used in NCDOT operations except Type II may be used in office environments for painting or light duty operations.
- Type III (household ladders) will not be used in NCDOT operations.

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APPENDIX B: Ladder Inspection Checklist

General Item to Be Checked

	Needs Repair	Condition OK
Loose steps or rungs (considered loose if they can be moved at all with the hand).....	<input type="checkbox"/>	<input type="checkbox"/>
Loose nails, screws, bolts, or other metal parts.....	<input type="checkbox"/>	<input type="checkbox"/>
Cracked, split, or broken uprights, braces, steps, or rungs.....	<input type="checkbox"/>	<input type="checkbox"/>
Slivers on uprights, rungs, or steps.....	<input type="checkbox"/>	<input type="checkbox"/>
Damaged or worn nonslip bases.....	<input type="checkbox"/>	<input type="checkbox"/>
Rusted or corroded spots.....	<input type="checkbox"/>	<input type="checkbox"/>

Stepladders

Wobbly (from side strain).....	<input type="checkbox"/>	<input type="checkbox"/>
Loose or bent hinge spreaders.....	<input type="checkbox"/>	<input type="checkbox"/>
Stop on hinge spreaders broken.....	<input type="checkbox"/>	<input type="checkbox"/>
Broken, split, or worn steps.....	<input type="checkbox"/>	<input type="checkbox"/>
Loose hinges.....	<input type="checkbox"/>	<input type="checkbox"/>

Extension Ladders

Loose, broken, or missing extension locks.....	<input type="checkbox"/>	<input type="checkbox"/>
Defective locks that do not seat properly when the ladder is extended.....	<input type="checkbox"/>	<input type="checkbox"/>
Deterioration of rope, from exposure to weather, acid or other destructive agents.....	<input type="checkbox"/>	<input type="checkbox"/>

Fixed Ladders

Loose, worn, or damaged rungs or side rails.....	<input type="checkbox"/>	<input type="checkbox"/>
Damaged or corroded parts of cage.....	<input type="checkbox"/>	<input type="checkbox"/>
Corroded bolts and rivet heads on inside of metal stacks.....	<input type="checkbox"/>	<input type="checkbox"/>
Damaged or corroded handrails or brackets on platforms.....	<input type="checkbox"/>	<input type="checkbox"/>
Weakened or damaged rungs on brick or concrete slabs.....	<input type="checkbox"/>	<input type="checkbox"/>
Base of ladder obstructed.....	<input type="checkbox"/>	<input type="checkbox"/>

Scaffolds**SPP# 1910.28****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the protection of North Carolina Department of Transportation (NCDOT) employees who work on scaffold work surfaces.

2.0 Scope and Applicability

Scaffolding has a variety of applications. It is used in new construction, alteration, routine maintenance, renovation, painting, repairing, and removal activities. Scaffolding offers a safer and more comfortable work arrangement compared to leaning over edges, stretching overhead, and working from ladders. Scaffolding provides employees safe access to work locations, level and stable working platforms, and temporary storage for tools and materials for performing immediate tasks.

Scaffolding accidents mainly involve personnel falls and falling materials caused by equipment failure, incorrect operating procedures, and environmental conditions. Additionally, scaffolding overloading is a frequent single cause of major scaffold failure.

This safety policy and procedure provides guidelines for the safe use of scaffolds. It includes training provisions and guidelines for scaffold erection and use.

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Additionally, it lists the types of scaffolds used in NCDOT and details general safety requirements for all scaffolds.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.28) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.451).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, scaffolds shall be erected, moved, dismantled, or altered only under the supervision of a competent person and will have guardrails and toeboards installed. When scaffolding hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Scaffolds will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Scaffolds. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Scaffolds.

6.1 Definitions

Brace

A tie that holds one scaffold member in a fixed position with respect to another member. Brace also means a rigid type of connection holding a scaffold to a building or structure.

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Coupler

A device for locking together the component tubes of a tube and coupler scaffold.

Harness

A design of straps which is secured about the employee in a manner to distribute the arresting forces over at least the thighs, shoulders, and pelvis, with provisions for attaching a lanyard, lifeline, or deceleration device.

Hoist

A mechanical device to raise or lower a suspended scaffold. It can be mechanically powered or manually operated.

Maximum Intended Load

The total load of all employee, equipment, tool, materials, transmitted, wind, and other loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time.

Mechanically Powered Hoist

A hoist which is powered by other than human energy.

Outriggers

The structural member of a supported scaffold used to increase the base width of a scaffold in order to provide greater stability for the scaffold.

Platform

The horizontal working surface of a scaffold.

Safety Belt

A strap with means for securing about the waist or body and for attaching to a lanyard, lifeline, or deceleration device.

Scaffold

Any temporary elevated or suspended platform and its supporting structure used for supporting employees or materials or both, except this term does not include crane or derrick suspended personnel platforms.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Safe Scaffold Erection and Use
- Types of Scaffolds Used in NCDOT
- Safety Requirements for Scaffolds

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6.2.1 Training

Employees should receive instruction on the particular types of scaffolds which they are to use. Training should focus on proper erection, handling, use, inspection, and care of the scaffolds. Training must also include the installation of fall protection, guardrails, and the proper use and care of fall arrest equipment.

This training should be done upon initial job assignment. Retraining shall be done when job conditions change. Periodic refresher training shall be done at the discretion of the supervisor.

The competent person(s) should receive additional training regarding the selection of scaffolds, recognition of site conditions, recognition of scaffold hazards, protection of exposed personnel and public, repair and replacement options, and requirements of standards.

6.2.2 Safe Scaffold Erection and Use

Safe scaffold erection and use is important in minimizing and controlling the hazards associated with their use. Scaffold work practices and rules should be based on:

- Sound design
- Selecting the right scaffold for the job
- Assigning personnel
- Fall protection
- Guidelines for proper erection
- Guidelines for use
- Guidelines for alteration and dismantling
- Inspections
- Maintenance and storage

Adherence to the above criteria will help control the hazards associated with scaffold use.

6.2.3 Types of Scaffolds

There are many different types of scaffolds used in NCDOT. The three major categories are:

- Self-supporting scaffolds
- Suspension scaffolds
- Special use scaffolds

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Self-supporting scaffolds are one or more working platforms supported from below by outriggers, brackets, poles, legs, uprights, posts, frames, or similar supports. The types of self-supporting scaffolds include:

- Fabricated Frame
- Tube and Coupler
- Mobile
- Pole

Suspension scaffolds are one or more working platforms suspended by ropes or other means from an overhead structures(s). The types of suspension scaffolds include:

- Single-Point Adjustable (Boatswain's Chairs)
- Two-Point Adjustable (Swing Stage)
- Multiple-Point Adjustable
- Multi-Lend
- Category
- Float (Ship)
- Interior Hung
- Needle Beam

Special use scaffolds and assemblies are capable of supporting their own weight and at least 4 times the maximum intended load. The types of special use scaffolds include:

- Form and Carpenter Bracket
- Roof Bracket
- Outrigger
- Pump Jack
- Ladder Jack
- Window Jack
- Horse
- Crawling Boards
- Step, Platforms, and Trestle Ladder

Detailed information on these types of scaffolds can be found in manufacturer's literature.

6.2.4 Safety Requirements for Scaffolds

Scaffolds are to be erected for persons engaged in work that cannot be done safely from the ground or from ladders. Therefore, several general requirements apply to all types of scaffolds. Appendix A lists the general requirements applicable to all scaffold types.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure adequate funds are available and budgeted for the purchase of scaffolds in their areas. They will also identify the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities related to scaffold erection and/or dismantling.

Supervisors will communicate appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are provided with PPE as necessary for their job.

Supervisors will ensure that a competent person is in charge of scaffold erection according to the manufacturer's specifications.

6.3.3 Competent Person

The competent person will oversee the scaffold selection, erection, use, movement, alteration, dismantling, maintenance, and inspection. The competent person will be knowledgeable about proper selection, care, and use of the fall protection equipment. Additionally, the competent person shall assess hazards.

6.3.4 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees will report damaged scaffolds, accessories, and missing or lost components. Employees will assist with inspections as requested.

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6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased scaffolds comply with current safety regulations and this safety policy and procedure.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.6 Central Equipment Unit

Central Equipment Unit will be responsible for ensuring that purchased scaffolds meet or exceed current safety regulations.

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APPENDIX A: Safety Requirements for Scaffolds

- The footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks shall not be used to support scaffolds or planks.
- No scaffold shall be erected, moved, dismantled, or altered except under the supervision of competent persons or as requested for corrective reasons by Safety and Loss Control Personnel.
- Guardrails and toeboards shall be installed on all open sides and ends of platforms more than 10 feet above the ground or floor, except needle beam scaffolds and floats. Scaffolds 4 feet to 10 feet in height having a minimum horizontal dimension in either direction of less than 45 inches shall have standard guardrails installed on all open sides and ends of the platform.
- Guardrails must be 2 X 4 inches, or the equivalent, not less than 36 inches or more than approximately 42 inches high, with a midrail, when required, of 1 X 4 inch lumber, or the equivalent. Supports must be at intervals not to exceed 8 feet. Toeboard and the guardrail shall extend along the entire opening.
- Scaffolds and their components must be capable of supporting without failure at least 4 times the maximum intended load.
- Any scaffold, including accessories such as braces, brackets, trusses, screw legs, ladders, couplers, etc., damaged or weakened from any cause must be repaired or replaced immediately, and shall not be used until repairs have been completed.
- All load-carrying timber members of scaffold framing shall be a minimum of 1,500 fiber (Stress Grade) construction grade lumber.
- All planking must be Scaffold Grades, or equivalent, as recognized by approved grading rules for the species of wood used. The maximum permissible span for 2 X 9 inch or wider planks is shown in the following:

	Full Thickness Undressed Lumber			Nominal Thickness Lumber	
Working load (p.s.f.)	25	50	75	25	50
Permissible span (ft.)	10	8	6	8	6

- The maximum permissible span for 1-1/4 X 9 inch or wider plank of full thickness shall be 4 feet with medium duty loading of 50 p.s.f.

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APPENDIX A: Safety Requirements for Scaffolds (Continued) 2

- All planking or platforms must be overlapped (minimum 12 inches) or secured from movement.
- An access ladder or equivalent safe access must be provided.
- Scaffold plank must extend over their end supports not less than 6 inches nor more than 18 inches.
- The poles, legs, or uprights of scaffolds must be plumb and securely and rigidly braced to prevent swaying and displacement.
- Overhead protection must be provided for men on a scaffold exposed to overhead hazards.
- Slippery conditions on scaffolds shall be eliminated immediately after they occur.
- No welding, burning, riveting, or open flame work shall be performed on any staging suspended by means or fiber of synthetic rope. Only treated or protected fiber or synthetic ropes shall be used for or near any work involving the use of corrosive substances or chemicals.
- Wire, synthetic, or fiber rope used for scaffold suspension shall be capable of supporting at least 6 times the intended load.
- Scaffolds shall be provided with a screen between the toeboard and guardrail, extending along the entire opening, consisting of No. 18 gauge U.S. Standard wire one-half inch mesh or the equivalent, when personnel are required to work or pass underneath the scaffolds.
- A safe distance from energized power lines shall be maintained.
- Tag lines shall be used to hoist materials to prevent contact.
- Suspension ropes shall be protected from contact with heat sources (welding, cutting, etc.) and from acids or other corrosive substances.
- Scaffolds shall not be used during high wind and storms.
- Ladders and other devices shall not be used to increase working heights on scaffold platforms.
- Scaffolds shall not be moved while employees are on them.
- Loose materials, debris, and/or tools shall not be accumulated to cause a hazard.
- Employees working on suspended scaffolds shall employ a fall-arrest system.

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APPENDIX A: Safety Requirements for Scaffolds (Continued) 3

- Scaffold components shall not be mixed or forced to fit which may reduce design strength.
- Scaffolds and components shall be inspected at the erection location. Scaffolds shall be inspected before each workshift, after changing weather conditions, or after prolonged work interruptions.
- Casters and wheel stems shall be pinned or otherwise secured in scaffold legs. Casters and wheels must be positively locked if in a stationary position.
- Tube and coupler scaffolds shall be tied to and securely braced against the building at intervals not to exceed 30 feet horizontally and 26 feet vertically.

Welding**SPP# 1910.252****Quick Reference**

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1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures through which North Carolina Department of Transportation (NCDOT) employees receive the training and proper equipment needed to safely perform welding operations.

2.0 Scope and Applicability

The welding process joins metal parts. Welding processes require heat and sometimes other substances to produce the weld. Byproducts resulting from the welding process include fumes and gases which can be serious health hazards to employees. Additionally, safety hazards can exist such as the potential for fire or explosion and injuries from arc radiation, electrical shock, or materials handling.

This safety policy and procedure provides guidelines for safely performing welding operations. It presents provisions for training, discussion on types of welding, safe work practices, and employee protection requirements. It also presents critical

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details on hot work permits, work in confined spaces, ventilation requirements when performing welding operations, and inspection requirements.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment unit within NCDOT.

This safety policy and procedure affects all employees who are exposed by their job duties to welding and torch cutting operations. These welding and torch cutting operations occur at but are not limited to equipment repair shops, equipment fabrication shops, ferry maintenance and construction operations such as bridge and road repair and maintenance.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.251-257) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.350-.354).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, welding operations will be performed only by authorized and trained employees. When welding hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Welding will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT'S safety policy and procedure on Welding. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT'S safety policy and procedure on Welding.

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6.1 Definitions

Approved

Listed or approved by a nationally recognized testing laboratory.

Confined Space

A space that is not designed for human occupancy, has limited openings for entry and exit, may lack adequate ventilation, and may contain or produce dangerous air contamination.

Hazardous

Any act, condition, or substance which poses health and safety risks to employees.

Hot Work Permit

A permit allowing employees to perform work involving welding, cutting, or any task that would deplete oxygen, create toxic fumes and vapors, or create the potential for fire or explosion.

Pulmonary

Any body function related to the lungs.

Welder/Welding Operator

Any operator of electric or gas welding and cutting equipment.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Types of Welding
- Welding Hazards
- Safe Work Practices
- Hot Work Permits
- Employee Protection
- Work in Confined Spaces
- Inspection

6.2.1 Training

Employees who perform welding operations will be trained to:

- Recognize the hazards associated with various welding operations
- Know the safe work practices for welding operations
- Understand the importance and requirements of Hot Work Permits
- Use the appropriate personal protective equipment (PPE) for the job

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- Recognize confined spaces and the requirements associated with them
- Understand the importance of regular inspections of welding equipment, attachments, and accessories

This training shall be made available upon initial employment or job re-assignment. Refresher training shall be provided upon the discretion of the supervisor.

6.2.2 Types of Welding

Several types of welding operations are used in NCDOT. The most common welding operations in NCDOT include:

- Gas welding and cutting
- Arc welding and cutting
- Resistance welding

The gas welding process unites metals by heating. The gases commonly used as the fuel gas are oxygen and acetylene. The gas cutting process removes metal by a chemical reaction of the base metal with oxygen at an elevated temperature.

The arc welding and cutting processes uses electric current and two welding leads. One welding lead is connected to the electric power supply while the other lead is attached to the work surface.

Resistance welding is a metal-joining process where welding heat is generated at the joint by the resistance to the flow of electric current.

6.2.3 Welding Hazards

The hazards associated with welding include health and safety hazards. Health hazards are primarily respiratory hazards due to the generation of fumes and gases. Safety hazards are generally physical hazards due to the work site and conditions and materials associated with the work site.

Health hazards associated with the generation of fumes and gases depend upon the welding process, the base material, the filler material, and the shielding gas if any. Health hazards include exposure to:

- Toxic gases
- Primary pulmonary gases
- Nonpulmonary gases
- Particulate matter
- Irritants and toxic inhalants

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Air sampling may be required to identify the fumes and gases emitted from a specific operation.

Safety hazards associated with welding operations include:

- Fire
- Proximity to combustible materials
- Hazardous locations (rooms containing flammable or combustible vapors)
- Closed containers that have held flammable liquids or other combustibles
- Electric shock (arc welding)
- Infrared and ultraviolet eye damage

Appendix A presents precautions that should be followed to minimize, control, or eliminate these safety hazards.

6.2.4 Safe Work Practices

Safe work practices for all welding operations include:

- Placing work at an optimal height to avoid back strain or shoulder fatigue
- Using fall protection equipment for work on elevated surfaces more than 6 feet above the floor or ground surface
- Wearing personal protective equipment (PPE) as applicable for the work conditions
- Following special precautions when welding or cutting in a confined space
- Posting warning signs to mark just-completed welding or cutting surfaces
- Following safe housekeeping principles
- Using equipment as directed by the manufacturer instructions or practices
- Removing any butane lighters, matches, or other combustibles from pockets prior to performing work
- Not performing welding work with oily clothing (Leathers may need to be worn over clothing)
- Following fire protection and prevention practices during the welding operation (See Appendix B for further details)
- Using proper ventilation techniques during welding operations (See Appendix C for further details and [SPP# 1910.94, Ventilation](#), for related information)

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6.2.5 Hot Work Permits

Hot Work Permits are a useful accountability tool to ensure that all the necessary precautions are taken prior to commencing welding. They also assure that employees are aware of and use the appropriate safeguards when performing welding operations. In confined spaces a hot work permit is required if any welding operations are performed in that space regardless of whether or not a confined space entry permit is required. Appendix D presents NCDOT's Hot Work Permit.

6.2.6 Employee Protection

Employee protection during welding operations must include:

- Safeguards and provisions for fall protection
- Tripping hazard prevention
- Eye protection
- Protection from arc welding rays
- Protective clothing
- Protection from electrical shock hazards

Additionally, to prevent injury from burns, all areas that have been just welded or cut will be marked to inform other employees that the material or area is hot.

For fall protection, employees will be provided either with fall protection such as safety belts, life lines, or railings where falls from heights of 6 feet or more are possible.

Tripping hazards will be minimized by welding lines being placed in order not to create trip and fall hazards. Cables will not block passageways, stairways, or other exits.

Eye protection will be provided by helmets or hand held shields being used during all arc welding or arc cutting operations, excluding submerged arc welding. Helpers or attendants will be provided with proper eye protection. Specifications for eye protection are detailed in Appendix E of this safety policy and procedure. Also, see [SPP# 1910.132, Personal Protective Equipment](#), for additional details.

Arc welding rays protection will be provided by non-combustible or flame resistant screens, shields or suitable eye protection to workers or other persons adjacent to the welding operations. Booths and screens shall permit circulation of air at floor level.

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Protective clothing will vary with the size, nature, and location of the work. Criteria for selection of protective clothing is detailed in Appendix E of this safety policy and procedure.

Electrical protective devices will be used to protect employees from the possibility of electrical shock when welding operations are performed in wet areas or areas where high humidity is present. Refer to [SPP# 1910.137, Electrical Protective Devices](#), for additional detail.

6.2.7 Work in Confined Spaces

No work is to commence until all requirements of the Confined Space Entry Safety Policy and Procedure are met and a Hot Work Permit is submitted. Refer to [SPP# 1910.146, Confined Space Entry](#), for additional details.

Mechanical ventilation will be provided during any confined space welding operation to prevent the accumulation of toxic materials or possible oxygen enrichment or deficiency. All heavy and portable equipment used in confined space welding or torch cutting operations will be secured before operations begin.

When a welder must enter a confined space through a manhole or other small opening, the welder will be attached to a manned lifeline. The lifeline will be attached to not interfere with the welding operation or with the removal of the welder in case of an emergency. A preplanned emergency rescue procedure will be in place prior to the welding operations.

When arc welding operations are completed or temporarily stopped, all electrodes will be removed from the holders. The holders are to be carefully positioned and stored so that accidental contact cannot occur. Additionally, all machines will be disconnected from their power source.

6.2.8 Inspections

All welding equipment including attachments and accessories will be inspected on a monthly basis by the supervisor or his or her designee. A written record including the date, type of equipment, equipment number, and equipment serial number, along with the signature of the employee performing the inspection will be maintained for a period of one year for review by regulatory agencies.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funding is available and budgeted to provide proper equipment, supplies, PPE, and training for welders. They will also be responsible for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will be responsible for ensuring the safe handling of welding and torch cutting equipment and ensuring safety, fire prevention and protection during welding and torch cutting processes.

Supervisors are also responsible for ensuring all welding equipment, including cables, lines and any accessories, are in good working condition. If any indication of damaged equipment is present such as broken or cut insulation on cables, etc., the supervisor will have that equipment removed from service and have it repaired.

6.3.3 Employees

Employees who are involved in welding operations are responsible for ensuring that all fire prevention and fire protection measures have been taken before any torch cutting or welding begins.

Employees are responsible for ensuring that all PPE's is worn properly for the specific hazard involved and that all equipment is in good working condition. Each employee is responsible for bringing hazards to the attention of his or her supervisor for correction as soon as the hazard is recognized.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or or securing the required training.

Additionally, Safety and Loss Control Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Safety Hazards Precautions

- Welding should be done in a permanent location that can be designed to provide maximum safety and fire protection. Otherwise, if the welding and cutting equipment is portable the site should be inspected to determine what fire protection equipment is necessary. See SPP # 1910.157, Fire Protection, for related details.
- Where welding is done near combustible materials, special precautions are necessary to prevent sparks or hot slag from reaching such material and starting fires. If the work cannot be removed, the combustible material should be moved a safe distance away.
- Welding or cutting activities should not be allowed in or near rooms containing flammable or combustible vapors, liquids, or dusts. If welding is required in these locations, all of the surrounding premises should be thoroughly ventilated and have frequent gas testing performed.
- Closed containers that have held flammable liquids or other combustibles should be thoroughly cleaned before welding or cutting.

APPENDIX B: Fire Protection and Prevention Practices

- Supervisors will inspect areas where welding or torch cutting is to take place and take proper measures to ensure fire hazards are eliminated or protected against. If combustibles are within 35 feet of the welding area, welders will use guards or shields to contain sparks and slag.
- Employees trained as fire watchers will be available in areas where welding is taking place. Appropriate fire extinguishers will be immediately available and accessible at the welding operation.
- No welding, torch cutting or heating shall be done where flammable paints, the presence of other flammable compounds, or heavy dust concentrations exist.
- A Hot Work Permit must be completed and followed where torch cutting and welding operations are conducted in close proximity to flammables, combustibles, hazardous materials or processes, and in confined spaces. Hot work permits assure that employees are aware of and use appropriate safeguards when conducting welding operations in these environments. (Appendix D presents NCDOT Hot Work Permit.)

APPENDIX C: Ventilation Guidelines for Welding Operations

- Mechanical ventilation will be provided for welders and helpers when:
 - Welding is being performed in a space less than 10,000 cubic feet per welder.
 - A room has a ceiling height less than 16 feet.
 - A confined space or welding space contains partitions, balconies, or other structural barriers to the extent that obstruct cross ventilation.
- The minimum rate for mechanical ventilation will be 2,000 cubic feet per minute per welder unless exhaust hoods or air-supplied respirators are provided.
- When using local exhaust hoods, they will be placed as close to the operation as possible. The exhaust hood will provide a rate of 100 linear feet per minute of air flow in the welding zone.
- Air-supplied respirators will be used when mechanical ventilating is not possible or when materials such as beryllium and cadmium are used. Refer to SPP # 1910.134, Respiratory Protection, for additional details.
- Local exhaust ventilation or air-supplied respirators will be used when welding or torch cutting on coated metals (e.g., zinc, mercury, cadmium, lead, etc.) indoors or in confined spaces. Outdoors operations shall be done using respiratory protective equipment.

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APPENDIX D: Hot Work Permit

Good for THIS SHIFT ONLY.

From: _____ Date: _____ To: _____
Time Time Time

Bldg: _____ Dept: _____ Floor: _____

Work to be done: _____

Work performed by: _____

name

Fire watcher(s) assigned? Yes ☐ No ☐

Names of fire

watcher(es): _____

Safety Checklist

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | • Have all flammable or combustible materials been removed from the work area (35 foot radius) |
| <input type="checkbox"/> | <input type="checkbox"/> | • If any flammables or combustibles cannot be removed, have they been covered by fire resistant shields or tarpaulins? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Is adequate fire fighting equipment readily available? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Have vulnerable areas of combustible floors and/or roofs been wet-down or properly covered? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Have wall and/or floor openings been properly covered? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Is the hot work equipment in good working condition? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Is a Confined Space Permit required? |
| <input type="checkbox"/> | <input type="checkbox"/> | • If pressurized lines or lines containing hazardous gases or liquids must be broken or cut, have the appropriate safety measures been taken? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Are Lock-Out Tag-Out Procedures required? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Has the atmosphere been checked with a multigas meter for flammable/explosive gas levels or other atmospheric hazards? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Is ventilation adequate? |
| | | If no, has forced ventilation or supplied air been provided? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Is adequate PPE (gloves, eye and hearing protection, breathing apparatus, special clothing, boots, etc.) provided for exposed workers? |
| <input type="checkbox"/> | <input type="checkbox"/> | • Are curtains or shields in place to protect others in the area? |

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APPENDIX D: Hot Work Permit (Continued) 2

Other special precautions taken: _____

Signatures Required Before Beginning Work

I have been instructed and I understand the hazards as well as the precautions necessary to do this work safely.

Signature of person performing the work

I verify that this work site has been inspected, that all necessary precautions have been taken to prevent fires and /or explosions to control hazardous conditions, and the individual signed above is authorized to begin doing this work.

Signature of supervisor

Date and time of signature

AM or PM

Signatures Required After Completing Work

This work was completed: _____
Date Time AM or PM

Signature of person performing the work

I have personally inspected the worksite after completion of the work and find the area to be in safe condition.

Signature of supervisor

Date

Time

AM or PM

APPENDIX E: Criteria for Personal Protective Equipment

Eye Protection Selection

Arc Welding and Arc Cutting. Helmets and hand held shields shall be used by personnel viewing the arc during welding and cutting operations, excluding submerged arc welding. Safety spectacles or goggles shall be worn during arc welding and cutting operations to provide protection from injurious rays from adjacent work and from flying objects. The spectacles or goggles may have either clear or colored glass, depending upon the amount of exposure to adjacent welding or cutting operations. Shade No.s 9 thru 14 are recommended for Safety Spectacles or goggles used for gas metal-arc and shielded metal-arc welding. Helpers shall be provided with proper eye protection in accordance with ANSI Standard Z87.1.

Gas Welding and Oxygen Cutting. Goggles or other suitable eye protection shall be used during all gas welding or oxygen-cutting operations. Spectacles with suitable filter lenses and without side shields are permitted for use during gas welding operations on light work, for torch brazing, or for inspection. Common sunglasses or safety issue sunglasses are not considered an acceptable alternative.

Resistance Welding and Brazing. All operators of resistance welding or resistance brazing equipment and their helpers shall use face shields, spectacles, or goggles, depending on the particular job, to protect their faces or eyes, as required.

Specifications for Protectors

Material Properties. Helmet and hand-held shield bodies shall be made of material which is thermally and electrically insulating, non-combustible or self-extinguishing, and opaque to visible ultra-violet, and infrared radiation. Helmets, shields, and goggles shall be capable of withstanding disinfecting.

Area of Protection. Helmets and hand held shields shall be designed to protect the face, forehead, neck, and ears to the vertical lines back of the ears from weld spatter and from direct radiant energy from the arc.

Window for Filter and Cover Plates. Helmets and hand-held shields shall be provided with a window for filter plates and cover plates, and shall be designed for easy removal and replacement of plates.

Materials Effect on Skin. All protective parts shall be constructed of a material which will not readily irritate or discolor the skin.

Ventilation. Goggles shall be ventilated to deter fogging of the lenses. Ventilation of cup-type goggles shall be baffled to prevent passage of light rays into the interior of the eyecup.

Cover Lens or Plates. Cover lenses or plates shall be provided to protect the filter lens or filter plate in goggles, helmets, or hand-held shields from welding spatter, pitting, and scratching. Cover lenses and plates shall be clear, glass, or self-extinguishing plastic, and need not be impact resistant.

Filter Lenses or Plates. All filter lenses and plates shall be impact resistant. All filter lenses and plates shall be substantially free from bubbles, waves, and other flaws. Except when a lens is ground to provide proper optical correction for defective vision, the front and rear surfaces of lenses and plates shall be smooth and parallel.

APPENDIX E: Criteria for Personal Protective Equipment (Continued) 2

Marking. Filter lenses and plates shall bear some permanent distinctive marking by which the manufacturer and shade number may be readily identified. In addition, all glass filter lenses and plates, when treated for impact resistance, shall be marked with the letter “H” to designate impact resistance.

Guide for Selection of Filters. A guide for the selection of appropriate shade numbers is given in the [SPP # 1910.132, Personal Protective Equipment](#).

Maintenance. Helmets and goggles shall be well-maintained. Helmets and goggles should not be transferred from one employee to another without being disinfected.

Protective Clothing

Criteria for Selection. Appropriate protective clothing required for any welding and torch cutting operation will vary with the size, nature, and location of the work to be performed.

Gloves. All welders and oxygen cutters shall wear protective gloves.

- For light work, durable flame-resistant cotton gloves should be used and for heavier work, leather or other suitable durable flame-resistant materials should be used. Insulated linings should be used to protect areas exposed to high radiant energy.

Aprons. Aprons made of leather or other suitable flame-resistant materials should be used when additional protection against sparks and radiant energy is desired.

Treated Clothing. Clothing treated with non-durable flame-retardant materials shall be retreated after each wetting or cleaning.

- Woolen clothing is preferable to cotton because it is not so readily ignited and helps protect the welder from changes in temperature. Cotton clothing, if used, should be chemically treated to reduce its combustibility. All outer clothing such as jumpers or overalls should be reasonably free from oil or grease.
- Sparks may lodge in rolled-up sleeves or pockets of clothing or cuffs of overalls or trousers. It is recommended that sleeves and collars be kept buttoned and pockets be eliminated from the front of clothing. Trousers or overalls should not be turned up on the outside.
 - For heavy work, fire-resistant leggings or other equivalent means should be used.
 - A sheet metal screen in front of the worker's legs can provide further protection against sparks and molten metal in torch cutting operations.
 - Cape sleeves or shoulder covers with bibs made of leather or other flame-resistant material should be worn during overhead welding or torch cutting operations. Skull caps made from flame-resistant material may be worn under helmets to prevent head burns.

For overhead welding and torch cutting, or welding and torch cutting in extremely confined spaces, ear protection is desirable. This may be accomplished by following the [SPP # 1910.95, Hearing Conservation Program](#), and using the recommended type of hearing protector.

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Accident Prevention Signs/Tags	1910.145	OSHA 1910.145, 1926.200
Aerial Truck Operations	1910.67	OSHA 1910.67, 1926.556
Air Compressor Storage Tanks	1910.169	OSHA 1910.169, 1926.306
Air Contaminants	1910.1000	OSHA 1910.1000
Asbestos	1910.1001	OSHA 1910.1001, NESHAPS, & HMMB
Asbestos Management	1910.1001A	OSHA 1910.1001, NESHAPS, & HMMB
Back Protection	1910.001	
Bloodborne Pathogens	1910.1030	OSHA 1910.1030
Compressed Gas Cylinders	1910.101	OSHA 1910.101, 102, 103, 104
Confined Space Entry	1910.146	OSHA 1910.146, 1915.11-16
Cranes	1910.179	OSHA 1910.179-181, 1926.550
Diving Operations	1910.410	OSHA 1910.410 - .429, 1926.1071-1092
Electrical Protective Devices	1910.137	OSHA 1910.137
Electrical Related Safety Work Practices	1910.301	OSHA 1910.301-335, 1926.400-417
Emergency & Fire Prevention Plans	1910.38	OSHA 1910.38
Excavation, Trenching & Shoring	1926.650	OSHA 1926.650
Explosives	1910.109	OSHA 1910.109, 1926.900-911, 913-914; 49 CFR Part 170-178; 27 CFR Part 55
Exposure to Hazardous Chemicals	1910.1450	OSHA 1910.1450
Fire Protection	1910.157	OSHA 1910.155-165, 1926.150-159
First Aid	1910.151	OSHA 1910.151, 1926.23
Flammable and Combustible Liquids	1910.106	OSHA 1910.106, 1926.152
Hand & Portable Power Tools	1910.241	OSHA 1910.241-244, 1926.300-305
Hazard Communication	1910.1200	OSHA 1910.1200, 1926.59
Hearing Conservation	1910.95	OSHA 1910.95, 1926.52
Housekeeping at Construction Sites	1926.25	OSHA 1926.25
Illumination	1926.56	OSHA 1926.56
Ionizing Radiation	1910.96	OSHA 1910.96
Ladders	1910.25	OSHA 1910.24-27, 1926.1053
Lead in Construction	1926.62	OSHA 1926.62
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Machine Guarding	1910.212	OSHA 1910.211-222, 243
Materials Handling	1910.176	OSHA 1910.176, 178-179, 1926.250-251
Non-ionizing Radiation	1910.97	OSHA 1910.97
Personal Protective Equipment	1910.132	OSHA 1910.132-140, 1926.28, 1926.95-107
Respiratory Protection	1910.134	OSHA 1910.134
Right of Inspections	1926.03	OSHA 1926.03
Rim Wheels	1910.177	OSHA 1910.177
Safety & Health Training	1926.21	OSHA 1926.21
Safety Assessment of Leased Property	A-3	None
Safety Color Markings for Hazards	1910.144	OSHA 1910.144
Safety Program Policy and Procedure	A-1	None
Safety Review of Facilities Construction Plans	A-2	None
Sanitation	1910.141	OSHA 1910.141, 1926.51
Scaffolds	1910.28	OSHA 1910.28, 1926.450-453
Slings	1910.184	OSHA 1910.184
Spray Finishing	1910.107	OSHA 1910.107
Unsafe Conditions	1910.002	None
Ventilation	1910.94	OSHA 1910.94, 1926.57
Welding	1910.252	OSHA 1910.251 - 255, 1926.350-354

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Air Compressor Storage Tanks	1910.169	OSHA 1910.169, 1926.306
Air Contaminants	1910.1000	OSHA 1910.1000
Asbestos	1910.1001	OSHA 1910.1001, NESHAPS, & HMMB
Asbestos Management	1910.1001A	OSHA 1910.1001, NESHAPS, & HMMB
Back Protection	1910.001	
Bloodborne Pathogens	1910.1030	OSHA 1910.1030
Compressed Gas Cylinders	1910.101	OSHA 1910.101, 102, 103, 104
Confined Space Entry	1910.146	OSHA 1910.146, 1915.11-16
Cranes	1910.179	OSHA 1910.179-181, 1926.550
Diving Operations	1910.410	OSHA 1910.410 - .429, 1926.1071-1092
Electrical Protective Devices	1910.137	OSHA 1910.137
Electrical Related Safety Work Practices	1910.301	OSHA 1910.301-335, 1926.400-417
Emergency & Fire Prevention Plans	1910.38	OSHA 1910.38
Excavation, Trenching & Shoring	1926.650	OSHA 1926.650
Explosives	1910.109	OSHA 1910.109, 1926.900-911, 913-914; 49 CFR Part 170-178; 27 CFR Part 55
Exposure to Hazardous Chemicals	1910.1450	OSHA 1910.1450
Fire Protection	1910.157	OSHA 1910.155-165, 1926.150-159
First Aid	1910.151	OSHA 1910.151, 1926.23
Flammable and Combustible Liquids	1910.106	OSHA 1910.106, 1926.152
Hand & Portable Power Tools	1910.241	OSHA 1910.241-244, 1926.300-305
Hazard Communication	1910.1200	OSHA 1910.1200, 1926.59
Hearing Conservation	1910.95	OSHA 1910.95, 1926.52
Housekeeping at Construction Sites	1926.25	OSHA 1926.25
Illumination	1926.56	OSHA 1926.56
Ionizing Radiation	1910.96	OSHA 1910.96
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Respiratory Protection	1910.134	OSHA 1910.134
Right of Inspections	1926.03	OSHA 1926.03
Rim Wheels	1910.177	OSHA 1910.177
Safety & Health Training	1926.21	OSHA 1926.21
Safety Assessment of Leased Property	A-3	None
Safety Color Markings for Hazards	1910.144	OSHA 1910.144
Safety Program Policy and Procedure	A-1	None
Safety Review of Facilities Construction Plans	A-2	None
Sanitation	1910.141	OSHA 1910.141, 1926.51
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Spray Finishing	1910.107	OSHA 1910.107
Unsafe Conditions	1910.002	None
Ventilation	1910.94	OSHA 1910.94, 1926.57
Welding	1910.252	OSHA 1910.251 - 255, 1926.350-354

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SPP Revision Index

SPP Name	SPP #	Revision #	Date	Description
Access to Medical Records	1910.20	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Accident Prevention Signs and Tags	1910.145	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Aerial Truck Operations	1910.67	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Air Compressor Storage Tanks	1910.169	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.

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SPP Revision Index (Continued) 2

SPP Name	SPP #	Revision #	Date	Description
Air Contaminants	1910.1000	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Asbestos	1910.1001	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference and asbestos sign illustration.
SPP Name	SPP #	Revision #	Date	Description
Asbestos Management	1910.1001 A	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference. Added Appendices B through G.
SPP Name	SPP #	Revision #	Date	Description
Back Protection	1910.001	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.

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SPP Revision Index (Continued) 3

SPP Name	SPP #	Revision #	Date	Description
Bloodborne Pathogens	1910.1030	0	7/14/93	Initial Release.
		1	12/14/95	Updated and released with SPP manual.
		2	3/96	Moved rest area custodians to category II.
SPP Name	SPP #	Revision #	Date	Description
Compressed Gas Cylinders	1910.101	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference and unnecessary definitions.
SPP Name	SPP #	Revision #	Date	Description
Confined Space Entry	1910.146	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference and "Note" in Appendix C about toxic mat'l atmospheric testing.
SPP Name	SPP #	Revision #	Date	Description
Cranes	1910.179	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.

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SPP Revision Index (Continued) 4

SPP Name	SPP #	Revision #	Date	Description
Diving Operations	1910.140	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference, mixed gas, and decompression chamber requirements.
SPP Name	SPP #	Revision #	Date	Description
Electrical Protective Devices	1910.137	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Electrical Related Safety Work Practices	1910.301	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Emergency & Fire Prevention Plans	1910.38	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.

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SPP Revision Index (Continued) 5

SPP Name	SPP #	Revision #	Date	Description
Excavation, Trenching, & Shoring	1926.650	0	2/10/94	Initial Release.
		1	12/14/95	Updated and released with SPP manual.
SPP Name	SPP #	Revision #	Date	Description
Explosives	1910.109	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Exposure to Hazardous Chemicals	1910.1450	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Fire Protection	1910.157	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference and added hydrostatic testing schedule.

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SPP Name	SPP #	Revision #	Date	Description
First Aid	1910.151	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Flammable & Combustible Liquids	1910.106	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Hand & Portable Power Tools	1910.241	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference and central tool program requirement.
SPP Name	SPP #	Revision #	Date	Description
Hazard Communication	1910.1200	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.

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SPP Name	SPP #	Revision #	Date	Description
Hearing Conservation	1910.95	0	9/13/93	Initial Release.
		1	12/14/95	Updated and released with SPP manual.
		2	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Housekeeping at Construction Sites	1926.25	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Illumination	1926.56	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference. Added 3 categories in Appendix A.
SPP Name	SPP #	Revision #	Date	Description
Ionizing Radiation	1910.96	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference and added M & T's Radiation Safety Officer responsibility.

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SPP Revision Index (Continued) 8

SPP Name	SPP #	Revision #	Date	Description
Ladders	1910.25	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference and defective ladder tag illustrations.
SPP Name	SPP #	Revision #	Date	Description
Lead in Construction	1926.62	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference. Corrected Appendix E.
SPP Name	SPP #	Revision #	Date	Description
Lockout/Tagout	1910.147	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Machine Guarding	1910.212	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.

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SPP Revision Index (Continued) 9

SPP Name	SPP #	Revision #	Date	Description
Materials Handling	1910.176	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Non-ionizing Radiation	1910.97	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Personal Protective Equipment	1910.132	0	12/14/95	Initial Release.
		1	3/96	Removed ADA ref and ear protect illus. Added hazard assessments being conducted by SEs.
SPP Name	SPP #	Revision #	Date	Description
Respiratory Protection	1910.134	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference. Changed program admin to SL&CMgr. Clarified qualified persons.

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SPP Revision Index (Continued) 10

SPP Name	SPP #	Revision #	Date	Description
Right of Inspections	1926.03	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Rim Wheels	1910.177	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Safety & Health Training	1926.21	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Safety Assessment of Leased Property	A-3	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.

Safety Policy and Procedure

SPP Revision Index (Continued) 11

SPP Name	SPP #	Revision #	Date	Description
Safety Color Markings for Hazards	1910.144	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Safety Program Policy & Procedure	A-1			
SPP Name	SPP #	Revision #	Date	Description
SPP Organization	A-2	0	12/14/95	Initial Release.
SPP Name	SPP #	Revision #	Date	Description
Sanitation	1910.141	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.

Safety Policy and Procedure

SPP Revision Index (Continued) 12

SPP Name	SPP #	Revision #	Date	Description
Scaffolds	1910.28	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Slings	1910.184	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Spray Finishing	1910.107	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Unsafe Conditions	1910.002	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.

Safety Policy and Procedure

SPP Revision Index (Continued) 13

SPP Name	SPP #	Revision #	Date	Description
Ventilation	1910.94	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
Welding	1910.252	0	12/14/95	Initial Release.
		1	3/96	Removed ADA reference.
SPP Name	SPP #	Revision #	Date	Description
SPP Name	SPP #	Revision #	Date	Description

SAFETY POLICY & PROCEDURE

SPP Technical References

SPP Name/SPP #
Technical References

Note: These technical references do not list the OSHA Standards upon which the SPPs are also based .

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SPP Technical References (Continued) 11

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Hearing Conservation	1910.95	No specific SOP
Housekeeping at Construction Sites	1926.25	10-9
Illumination	1926.56	No specific SOP
Ionizing Radiation	1910.96	11B-17, 11B-63
Ladders	1910.25	12B-15
Lead in Construction	1926.62	No specific SOP
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SPP to SOP Index (Continued) 2

SPP Name	SPP #	Related SOPs
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Personal Protective Equipment	1910.132	10-12, 10-13
Respiratory Protection	1910.134	10-13
Right of Inspections	1926.03	No specific SOP
Rim Wheels	1910.177	11A-33, 11A-36
Safety & Health Training	1926.21	No specific SOP
Safety Assessment of Leased Property	A-3	No specific SOP
Safety Color Markings for Hazards	1910.144	No specific SOP
Safety Program Policy and Procedure	A-1	No specific SOP
Safety Review of Facilities Construction Plans	A-2	No specific SOP
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